ORDER NO. KMF0105292S1
F7

Service Manual

Compact Plain Paper Fax/Multi Function Plain Paper Fax

KX-FP245 / KX-FP250 / KX-FP250C / KX-FM260 / KX-FP270 / KX-FP270C / KX-FM280 / KX-FM280C

(for U.S.A.)
(for Canada)

Parts Change

Please file and use this supplement manual together with the original service manuals for the following models.

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic

1. FORMER SUPPLEMENT

1.1. Sup No. 2 or Sup No. 3 (KMF0103276S1)

Note:
Supplement No. 1~2 have already supplied with printed matter. Please refer to that.

2. REPLACEMENT PARTS LISTS

2.1. REFERENCE CHART

Reason for Change	
*The following items (1-8) indicate the reason for change. See the “Notes” column for each part in ORIGINAL AND NEW PARTS COMPARISON LISTS .	
1. Improve performance	Remarks: *a: To share the part with other models.
2. Change of material or dimension	
3. To meet approved specification	
4. Standardization	
5. Addition	
6. Deletion	
7. Correction	
8. Other	

Interchangeability Code			
**The following items (V-Z) indicate the interchangeability. See the “Notes” column for each part in ORIGINAL AND NEW PARTS COMPARISON LISTS .			
	Parts	Set Production	
V	Original New	Early (before change) Late (after change)	Original or new parts may be used in early or late production se Use original parts until exhausted, then stock new parts.
W	Original New	Early (before change) Late (after change)	Original parts may be used in early production sets only. New p may be used in early or late production sets. Use original parts possible, then stock new parts.
X	Original New	Early (before change) Late (after change)	New parts only may be used in early or late production sets. Stock new parts.
Y	Original New	Early (before change) Late (after change)	Original parts may be used in early production sets only. New p may be used in late production sets only. Stock both original ar parts.

Interchangeability Code		
**The following items (V-Z) indicate the interchangeability. See the "Notes" column for each part in ORIGINAL AND NEW PARTS COMPARISON LISTS .		
	Parts Set Production	
Z	Other	

Note:
Alphabets in the "Remarks" column in the following lists correspond to the alphabets in the "Remarks" in REFERENCE CHART.

2.2. ORIGINAL AND NEW PARTS COMPARISON LISTS

Ref No.	Part No.		Part Name & Descriptions	Pcs/Set	Remarks	N
	Original Part No.	New Part No.				
CABINET AND ELECTRICAL SECTION						
64	PFDE1034Y	PFDE1034X	GUIDE, HEAD HOLDER	1	*a	1
67	PFDE1035Y	PFDE1035X	GUIDE, HEAD HOLDER	1	*a	1

TN / KXFP245, KXFP250, KXFP250C / KXFM260, KXFP270, KXFP270C / KXFP280, KXFP280C

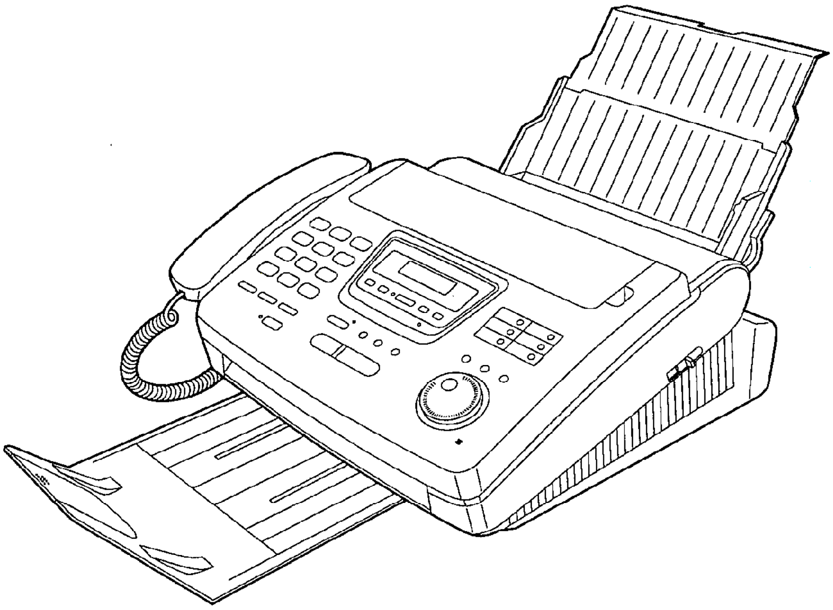
ORDER NO. KM79806211C1
F7

Service Manual

Compact Plain Paper FAX

KX-FP270

(for U.S.A.)



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When you note the serial number, write down all 11 digits. The serial number may be found on the bottom of the unit.

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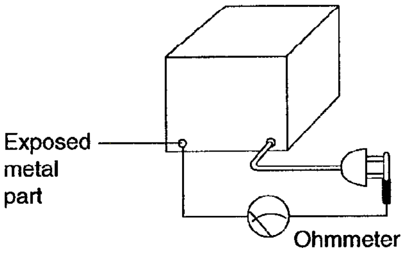
SAFETY PRECAUTIONS

1. Before servicing, unplug the AC power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screwheads, control shafts, bottom frame, etc.).
   Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.
   The equipment should be repaired and rechecked before it is returned to the customer.



Resistance = more than 1MΩ
(at DC 500 V)

FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.
When repairing, the following precautions will help prevent recurring malfunctions.

1) Cover the plastic part's boxes with aluminum foil.
2) Ground the soldering irons.
3) Use a conductive mat on the worktable.
4) Do not touch the IC or LSI pins with bare fingers.

BATTERY CAUTION

CAUTION

Danger of explosion if the battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to following caution:

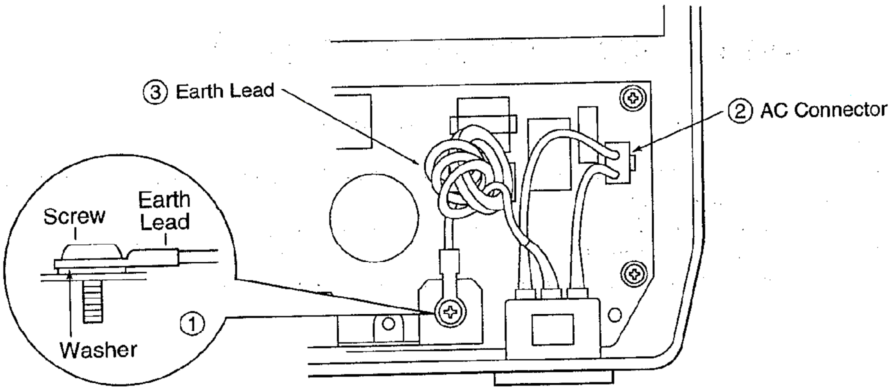
Disposal of lithium batteries should be performed by permitted, professional disposal firms knowledgeable in state government federal and local hazardous materials and hazardous waste transportation and disposal requirements.
A battery continues to have no transportation limitations as long as it is separated to prevent short circuits and packed in strong packaging.
Commercial firms that dispose of any quantity of lithium cells should have a mechanism in place to account for their ultimate disposition. This is a good practice for all types of commercial or industrial waste.

Recommend Type Number:	CR2032 (BATT)	Manufactured by MATSUSHITA
	CR2032 (BATT)	Manufactured by SONY

AC CAUTION

For safety, before closing the lower cabinet , please make sure of the following precautions.
① The earth lead is fixed with the screw.
② The AC connector is connected properly.
③ Wrap the earth lead around the core 3 times.

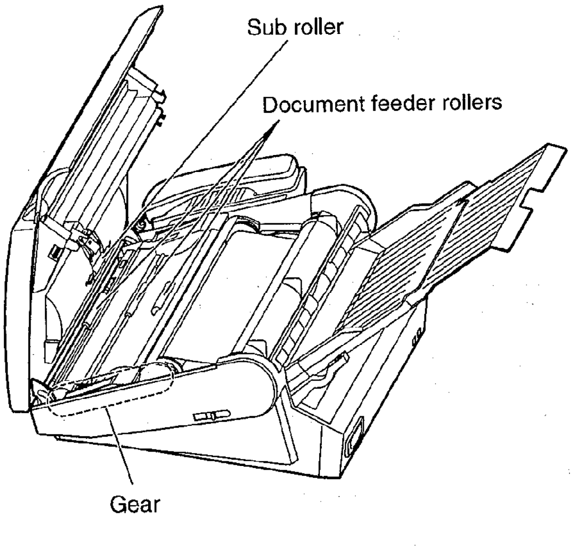
(BOTTOM VIEW)


③ Earth Lead
② AC Connector
Screw
Earth Lead
Washer
①

PERSONAL SAFETY PRECAUTIONS

1. MOVING SECTIONS OF THE UNIT

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit. The moving sections of the unit are the rollers and a gear. There is a separation roller and a document feed roller which are rotated by the document feed motor. A gear rotates the two rollers. Be careful not to touch them with your hands, especially when the unit is operating.

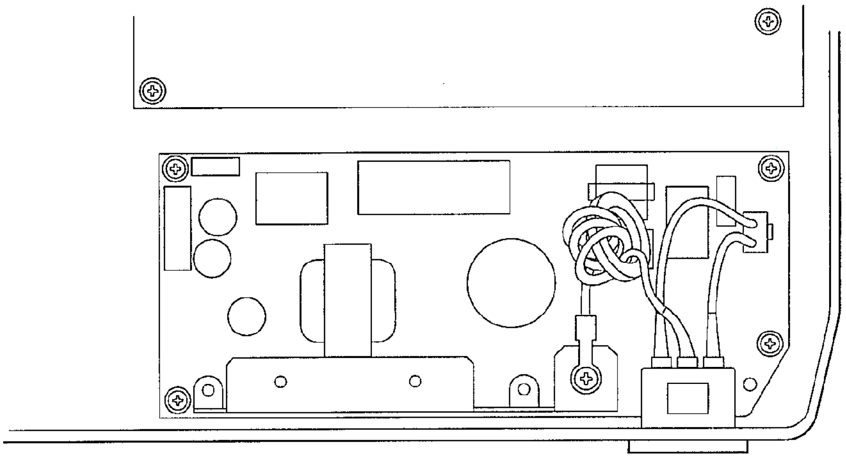

Sub roller
Document feeder rollers
Gear

2. LIVE ELECTRICAL SECTIONS

All the electrical sections of the unit supplied with AC power by the AC power cord are live.
Never disassemble the unit for service with the AC power supply plugged in.

AC voltage is supplied to the primary side of the power supply unit.
Therefore, always unplug the AC power cord before disassembling for service.

Be careful of "High Voltage" in this area.

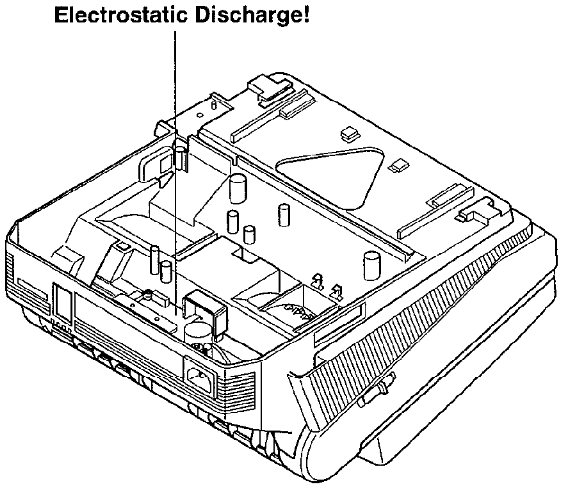


(Bottom view)

SERVICE PRECAUTIONS

1. PRECAUTIONS TO PREVENT DAMAGE FROM STATIC ELECTRICITY

Electrical charges accumulate on a person. For instance, clothes rubbing together can damage electric elements or change their electrical characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity. Never touch the electrical sections such as the power supply unit, etc.



FEATURES

General

- Help function

  Display:
  1. `HOW TO SET UP`
  2. `JOG/AUTO DIAL`
  3. `TAD OPERATION`
  4. `FAX SENDING`
  5. `FAX RECEIVING`
  6. `COPIER`
  7. `Q and A`
  8. `ERRORS`
  9. `REPORTS`
  10. `CALLER ID`
- LCD (Liquid Crystal Display) readout
- IQ-FAX™ (for U.S.A. only)

  This feature can only be used by those who apply to the FaxSav service.

  IQ-FAX is intelligent faxing which allows you to send faxes via the internet by using the IQ-FAX button. Behind the IQ-FAX button is the FaxSav Global Fax Network which manages the delivery of your fax to any fax machine in the world. It routes your fax via the best and most time efficient route and will automatically resend your fax for you, if the receiving fax machine is unavailable.

  This "fax-only" network has the added advantage of cost efficiency due to the internet being integrated into the net work. Every fax is secure since the FaxSav net work utilizes the highest encryption legally allowed, ensuring that your documents stay secure. You get the benefits of carefree faxing with savings associated with the use of the internet. It is simple, quick, and secure.

Digital Answering System

- Voice Time/Day Stamp
- 18-Minutes recording time
- Voice guidance for remote operation
- Voice and fax paper call

Plain Paper Facsimile Machine

- 9 second transmission speed *
- 15 second transmission speed **
- Letter/Legal, G3 compatible
- Automatic document feeder (15 sheets)
- 10 stations one-touch dialer
- Broadcast (up to 109 station)
- Resolution : Standard/Fine/Super fine/Half tone (64 level)
- LCD Contrast : Normal/Darker
- Delayed transmission
- Polling function
- Overseas transmission function
- Remote FAX receiving using an extension phone
- 150-sheet paper capacity
- Automatic fax/phone switching
- Distinctive ring detection ***
- High speed 14400 bps fax modem
- Out of paper reception (up to 28 papers) ****

* The 9 second speed is based upon the CCITT No. 1 Test Chart on the condition that memory transmission is performed.

** The 15 second speed is based upon the CCIT No. 1 Test Chart.

*** Subscription to distinctive ring services required.

**** 350KB memory. Actual number of Pages depends upon the contents of the Pages and the resolution. 28-page capacity based upon CCITT No. 1 Test Chart at standard resolution.

Large Memory (28 pages) ※Performed by DRAM

Approx. 28 pages of memory reception
Approx. 25 pages of memory transmission

Integrated Telephone System

- On-hook dialing
- Digital duplex speakerphone
- Voice muting
- Redialing function
- 100-Station telephone directory with *Jog Dial*
- One-Touch dial (5x2 Phone Numbers)

Copier function

- Multi-copy function (up to 99 copies)
- Enlargement and reduction
- Collate
- 64-Level halftone
- Electronic film indicator

SPECIFICATIONS

These specifications are for the U.S.A. version only.
Refer to the simplified manual (cover) for other areas.

Applicable Lines:	Public Switched Telephone Network
Document Size:	Max. 216 mm ($8\frac{1}{2}$") in width Max. 600 mm ($23\frac{5}{8}$") in length
Effective Scanning Width:	208 mm ($8\frac{3}{16}$")
Recording Paper Size:	Letter: 216×279 mm ($8\frac{1}{2}$"×11") Legal: 216×356 mm ($8\frac{1}{2}$"×14")
Effective Printing Width:	208 mm ($8\frac{3}{16}$")
Transmission Time*:	Approx. 9 sec./page (Original mode)** Approx. 15 sec./page (Original mode)*** Approx. 30 sec./page (G3 Normal mode)
Scanning Density:	Horizontal: 8 pels/mm (203 pels/inch) Vertical: 3.85 lines/mm (98 lines/inch)—STANDARD mode 7.7 lines/mm (196 lines/inch)—FINE/HALF TONE mode 15.4 lines/mm (392 lines/inch)–SUPER FINE Mode
Halftone Level:	64-level
Scanner Type:	CCD Image Sensor
Printer Type:	Thermal Printing
Data Compression System:	Modified Huffman (MH), Modified READ (MR)
Modem Speed:	14,400/12,000/9,600/7,200/4,800/2,400 bps; Automatic Fallback
Operating Environment:	5–35°C (41–95°F), 20–80 % RH(Relative Humidity)
Dimensions (H×W×D):	154×365×355 mm ($6\frac{1}{16}$"×$14\frac{3}{8}$"×$13\frac{31}{32}$")
Mass (Weight):	Approx. 4.85 kg (10.7 lb.)
Power Consumption:	Standby: Approx. 6.0 W Transmission: Approx. 14 W Reception: Approx. 37 W (When receiving a 20% back document) Copy: Approx. 48 W (When copying a 20% back document) Maximum: Approx. 160 W (When using a 100% back document)
Power Supply:	120 V AC, 60 Hz (This unit will not function at 50 Hz.)
Memory Capacity:	Voice memory: Approx. 18 minutes of recording time including the greeting message**** Fax memory: Approx. 28 pages memory reception Approx. 25 pages memory transmission (Based on CCITT No. 1 Test Chart in standard resolution.)

* Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of the receiving unit.

** The 9 second speed is based upon the CCITT No. 1 Test Chart on the condition that memory transmission is performed. (Refer to next page.)

*** The 15 second speed is based upon the CCITT No. 1 Test Chart . (Refer to next page.)

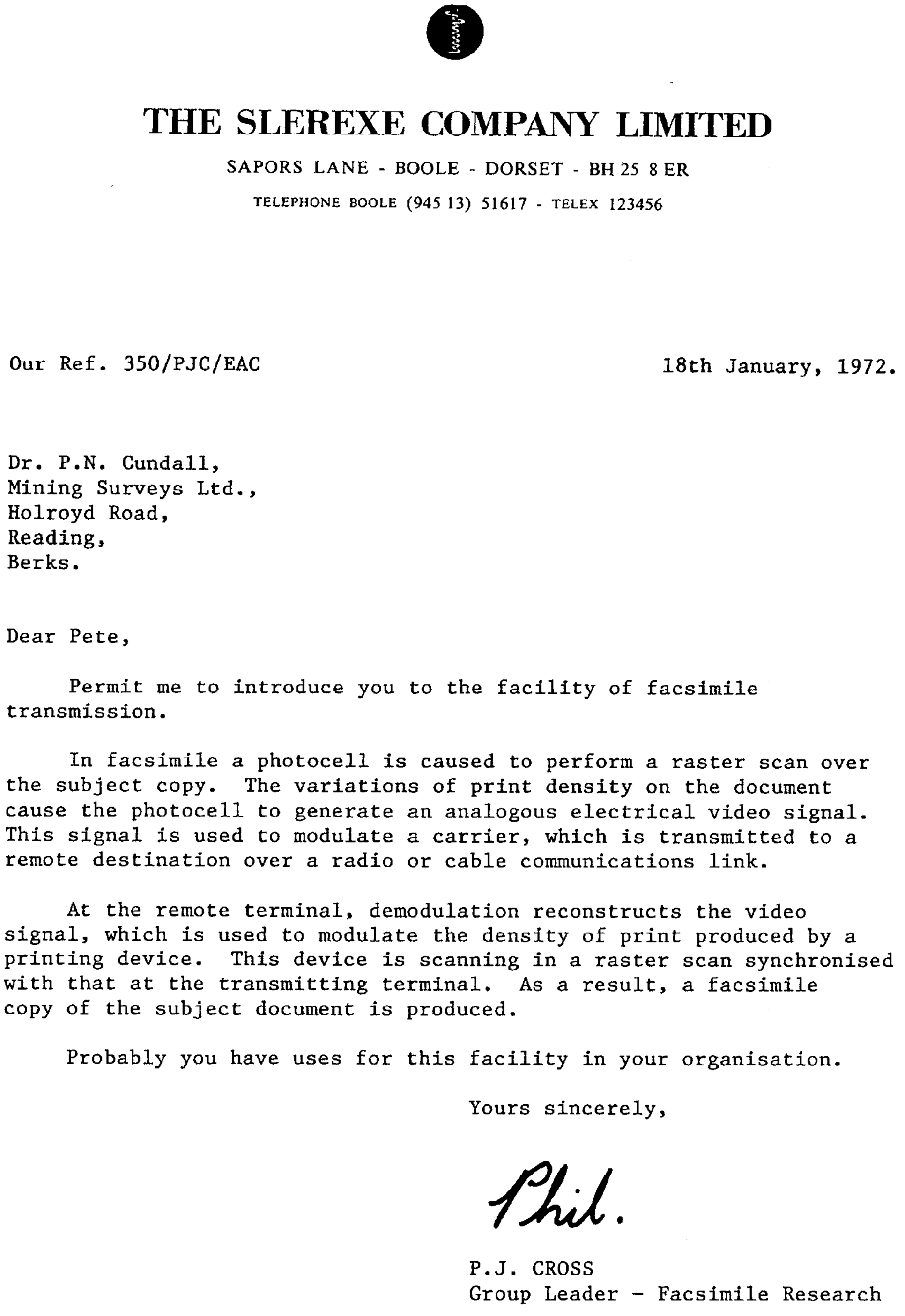
**** Recording time may be reduced by the calling party's background noise.

Design and specifications are subject to change without notice.

OPTIONAL ACCESSORIES

Part No.	Description	Comment
KX-FA135	Film cartridge	1 cartridge & 1 film : 216 mm × 100 m ($8\frac{1}{2}$"×328') roll (Prints approx. 330 letter size pages)
KX-FA136	Replacement film	2 films : 216 mm × 100 m ($8\frac{1}{2}$"×328') rolls (Prints approx. 660 letter size pages total)

CCITT NO. 1 TEST CHART (Actual size)



THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC 18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

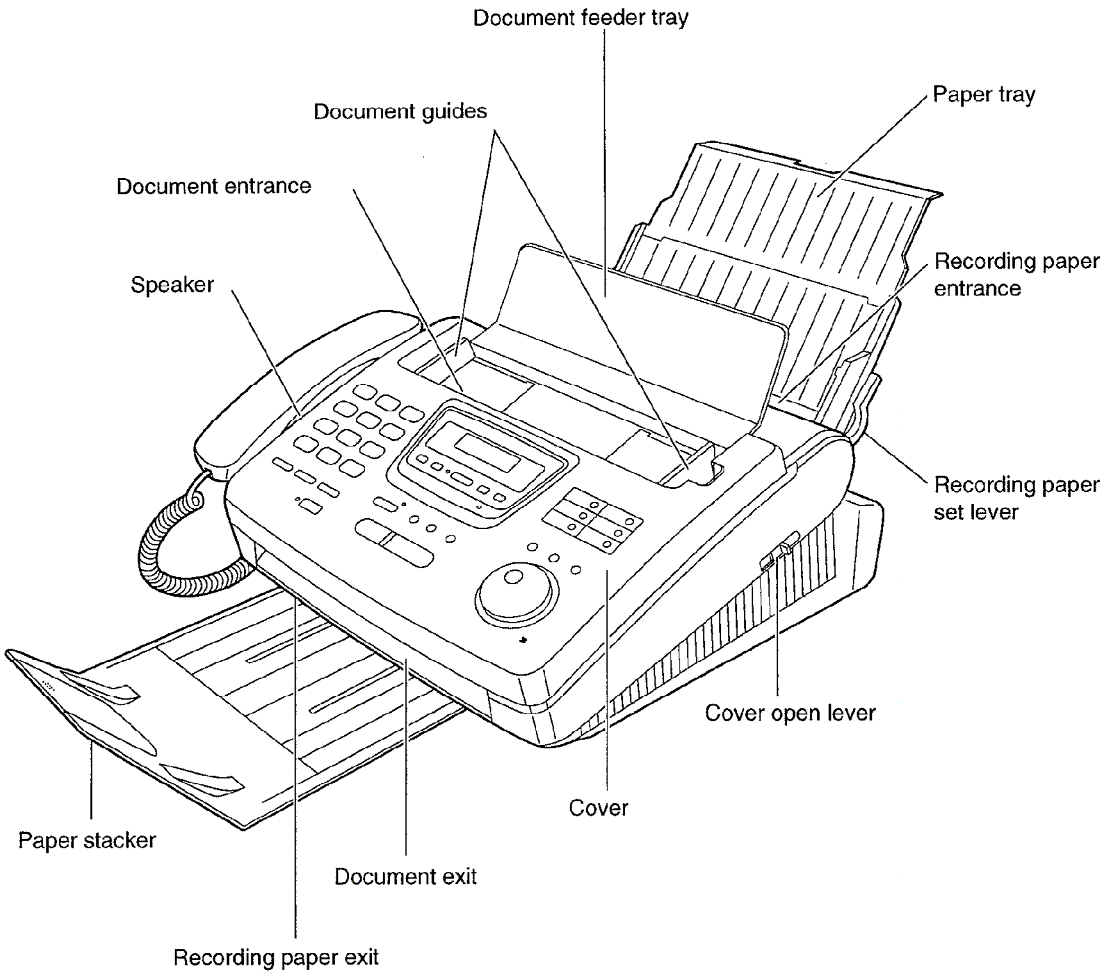
Yours sincerely,

Phil.

P.J. CROSS
Group Leader - Facsimile Research

LOCATION OF CONTROLS

1. OVERVIEW


Document feeder tray
Document guides
Paper tray
Document entrance
Recording paper entrance
Speaker
Recording paper set lever
Cover open lever
Cover
Paper stacker
Document exit
Recording paper exit

2. CONTROL PANEL

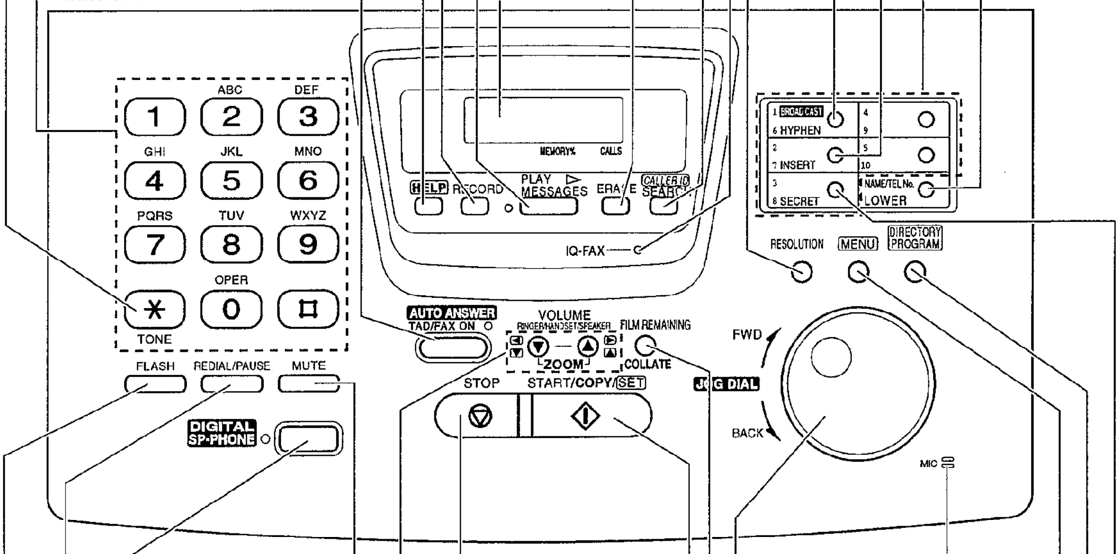
- Used to select a resolution.
- Used to send faxes using the IQ-FAX function.
- Used for the Caller ID service.
- Used to erase recorded messages.
- Used to erase your own recorded greeting messages.
- Used to change from pulse to tone during dialing.

Dial keypad

- Used to play recorded messages.
- Used to record greeting messages.
- Used to record memo messages and a telephone conversation.
- Used to print a quick reference.
- Used to turn on/off the auto answer mode.

Display panel

- Used for transmission to multiple stations.
- Used to insert a hyphen.
- Used to insert one character or one space.
- Used for One-Touch Dial.
- Used as command keys.
- Used to confirm a stored telephone number.
- Used to select stations 6-10 for One-Touch Dial.


ABC
DEF
1
2
3
GHI
JKL
MNO
4
5
6
PQRS
TUV
WXYZ
7
8
9
OPER
*
0
#
TONE
FLASH
REDIAL/PAUSE
MUTE
DIGITAL SP-PHONE
MEMORY%
CALLS
HELP
RECORD
PLAY MESSAGES
ERASE
CALLER ID SEARCH
IQ-FAX
AUTO ANSWER
TAD/FAX ON
VOLUME
RINGER/HANDSET/SPEAKER
FILM REMAINING
ZOOM
COLLATE
STOP
START/COPY/SET
JOG DIAL
FWD
BACK
MIC
1 BROADCAST
6 HYPHEN
2
7 INSERT
3
8 SECRET
4
9
5
10
NAME/TEL No.
LOWER
RESOLUTION
MENU
DIRECTORY PROGRAM

- Used for voice muting.
- Used for quick playcack.
- Used for speaker-phone operation.
- Used to redial the last number dialed.
- Used to insert a pause during dialing.
- Used as a hookswitch.
- Used for slow playback.

- Used to stop an operation or cancel programming.
- Used to delete a character or number.

- Used to adjust volumes.
- Used to select feature settings during programming.
- In the copy mode, used to select an enlargement/ reduction rate.

- Used to initiate fax transmission, reception or copying.
- Used to store a setting during programming.

- Used to check the amount of remaining film.
- In the copy mode, used to choose between "Collated and Uncollated".

- Used to talk with the other party when using the speakerphone.
- Use to record greeting messages and memo messages.

- Used to initiate or exit programming.

- Used to store or edit names and telephone numbers.

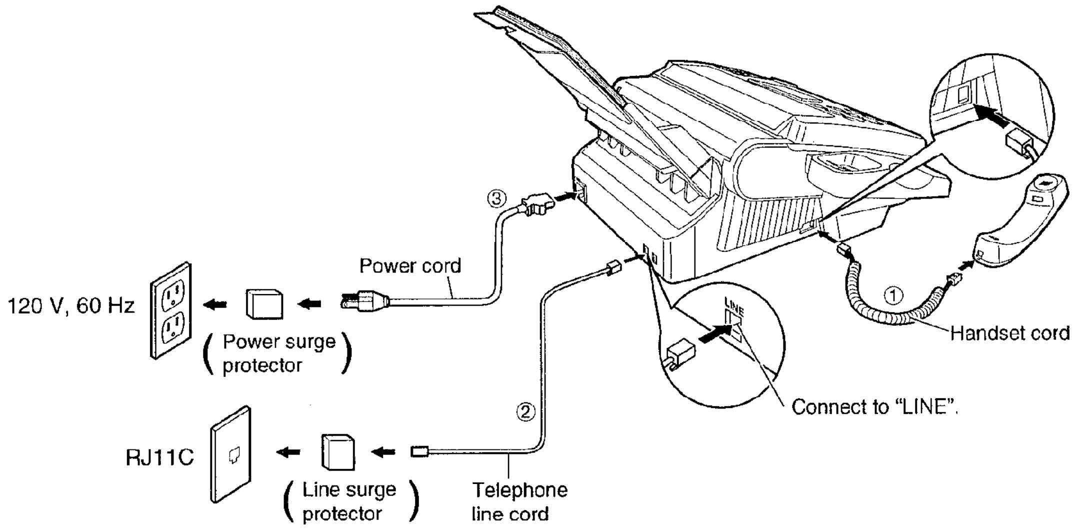
- Used to keep the telephone number secret.

- Used to search for a stored name.
- Used to select characters during programming.
- Used to select the basic features during programming.
- Use to skip and/or repeat the recorded messages in the answering device.

CONNECTIONS

① **Connect the handset cord.**
② **Connect the telephone line cord.**
③ **Connect the power cord.**
•When the power is turned on for the first time, the unit will print some basic information.

This connection is for the U.S.A. version only.
Refer to the simplified manual (cover) for other areas.



Note:
- The warranty does not cover damage due to power line surges or lighting.
- For additional equipment protection, we recommend the use of a surge protector. The following types are available; TELESPIKE BLOK MODEL TSB (TRIPPLE MFG. CO.), SPIKE BLOK MODEL SK6-0 (TRIPPE MFG. CO.), SUPER MAX (PANAMAX) or MP1 (ITW LINX).
- When you operate this product, the power outlet should be near the product and easily accessible.
- If the following message is displayed when the unit is plugged in, the recording paper set lever is released.

Display: `CHECK LEVER`

Move the lever back.

Automatic dialing mode setting

- When the telephone line cord and the power cord are connected, the unit will automatically start to detec the dialing mode.

Display: `CHECKING LINE`

Wait until one of the following messages is displayed.

— If you line has touch tone service:

`LINE IS TONE`

— If you line has rotary pulse dial service:

`LINE IS PLUSE`

- If the power cord is desconnected or a power failure occure, the unit will detect the dialing mode again when power is restored.
- You can change the dialing mode setting manually by user mode.
- If you connect the power cord before connecting the telephone line cord, the following messages will be shown alternately.

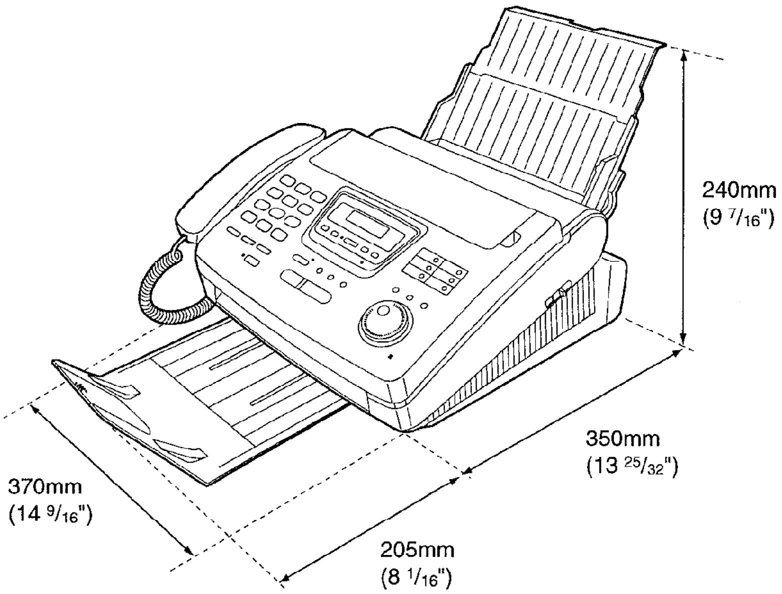
`INSERT TEL LINE` ◄——► `NO TEL LINE`

Connect the telephone line cord.

INSTALLATION

1. INSTALLATION SPACE

The space required to install the unit is shown below.
The dimensions given are necessary for the unit to operate efficiently.



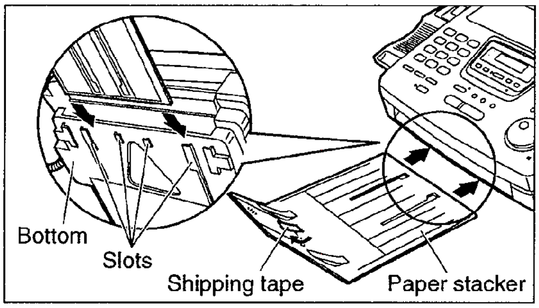
NOTE

Avoid excessive heat or humidity.
Use the unit within the following ranges of temperature and humidity.
Ambient temperature: 5°C to 35°C
Relative humidity: 20% to 80% (without condensation)
Power cord length should be less than 5 meters (16.4 feet). Using a longer cord may reduce the voltage or cause malfunctions.
Avoid direct sunlight.
Do not install near devices which contain magnets or generate magnetic fields.
Do not subject the unit to strong physical shock or vibration.
Keep the unit clean. Dust accumulation can prevent the unit from functioning properly.
To protect the unit from damage, hold both sides when you move it.

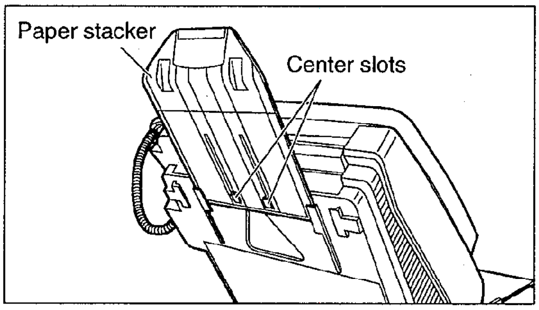
2. INSTALLING THE PAPER STACKER

(1) Remove the shipping tape from the paper stacker.

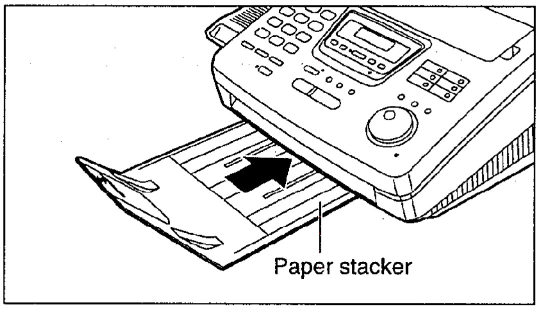
(2) Lift the front of the unit and insert the paper stacker into the slots.


Bottom
Slots
Shipping tape
Paper stacker

(3) Confirm if the paper stacker is locked with the center slots.

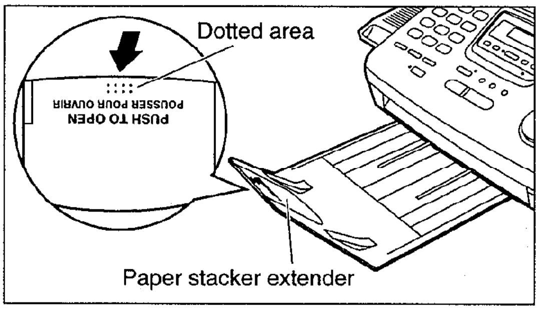

Paper stacker
Center slots

(4) Slide the paper stacker until it stops.

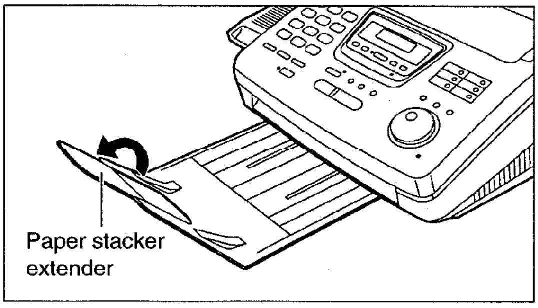

Paper stacker

● Using legal size paper

(1) Press the dotted area on the paper stacker extender.

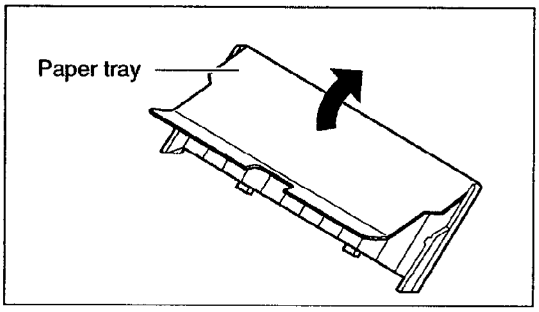

Dotted area
PUSH TO OPEN
POUSSER POUR OUVRIR
Paper stacker extender

(2) Open the paper stacker extender.

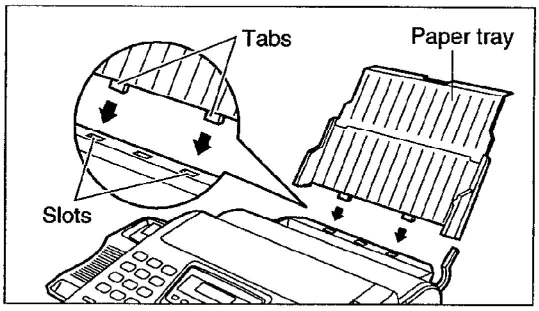

Paper stacker
extender

3. INSTALLING THE PAPER TRAY

(1) Open the paper tray.



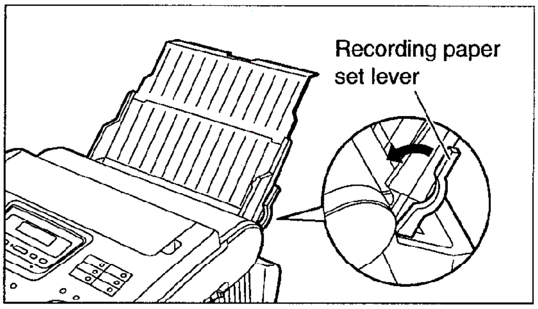
(2) Insert the two tabs on the paper tray into the slots on the back of the unit.
- Do not place the unit in areas where the paper tray may be obstructed by a wall, etc.


Tabs
Paper tray
Slots

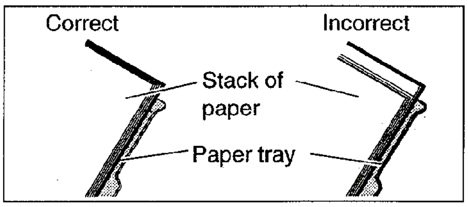
4. INSTALLING THE RECORDING PAPER

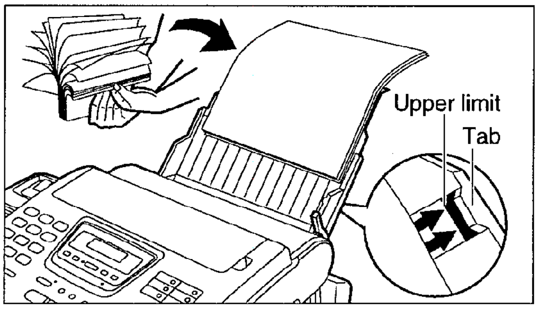
Letter or legal size recording paper can be loaded.
The paper tray can hold up to 150 sheets of 75 g/m² (20 lb.) paper. You may use 60 to 90 g/m² (16 to 24 lb.) paper.
For best results, use inkjet paper like Hammermill® Jet Print. If you use other types of paper, the print quality may be affected.

(1) Pull the recording paper set lever forward.


Recording paper set lever

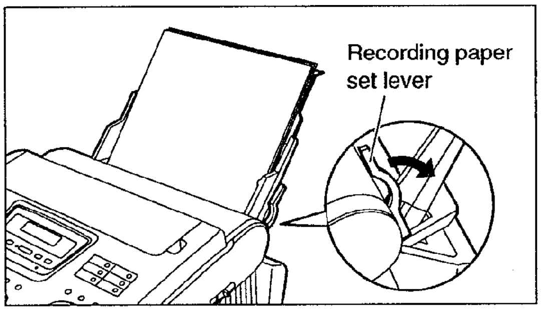
(2) Fan the stack of paper to prevent a paper jam and insert the paper into the paper tray.
- The height of the stack of the paper should not exceed the upper limit on the paper tray, otherwise a paper jam or multi-feed may occur.
- The paper should not be over the tab.
- If the paper is not inserted correctly, readjust the paper or a paper jam may occur.


Correct
Incorrect
Stack of paper
Paper tray


Upper limit
Tab

Trademark: Hammermill® is a registered trademark of INTERNATIONAL PAPER in the United States and/ or other countries.

(3) Move the recording paper set lever back.



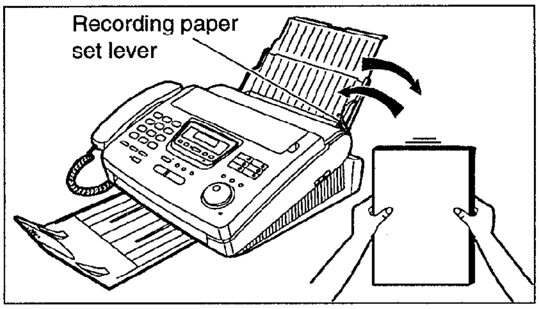
Note:

- Avoid paper with a cotton and/or fiber content that is over 20%, such as letterhead paper or those used for resumes.
- Do not use different types or thicknesses of paper in the paper tray at the same time. This may cause a paper jam.
- Avoid extremely smooth or shiny paper that is highly textured. Also avoid paper that is coated, damaged or wrinkled.
- Avoid double-sided printing.
- Do not use paper printed from this unit for double-sided printing with other copiers or printers, or a paper jam may occur.

• Adding paper to the paper tray

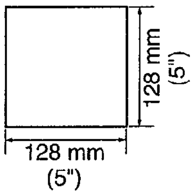
1. Pull the recording paper set lever forward.
   - The unit will beep and the following message is displayed.

   Display: `CHECK LEVER`
2. Remove the installed paper.
3. Add paper to the removed paper and straighten it.
4. Fan the stack of paper and insert it into the paper tray.
5. Move the recording paper set lever back.

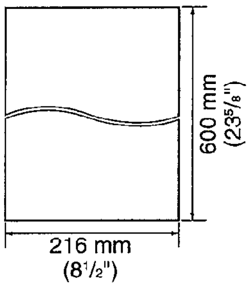


• Documents the unit can feed

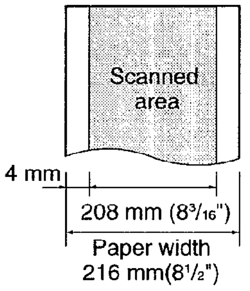
Minimum size



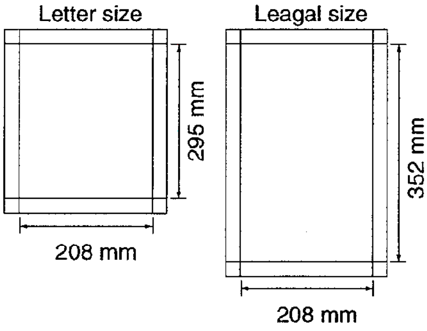
Maximum size



Effective scanning area



Effective printing area



Note:

- Remove clips, staples or other similar fastening objects.
- Check that ink, paste or correction fluid has dried.
- Do not send the following types of documents. Use copies for fax transmission.
  - —Chemically treated paper such as carbon or carbonless duplication paper
  - —Electrostatically charged paper
  - —Heavily curled, creased or torn paper
  - —Paper with a coated surface
  - —Paper with a faint image
  - —Paper with printing on the opposite side that can be seen through the front (e.g. newspaper)
- Only 15 sheets can be accepted at one time (60 to 75 g/m^2). For a single sheet of 45 to 90 g/m^2, only one sheet can be accepted at one time.

Document weight

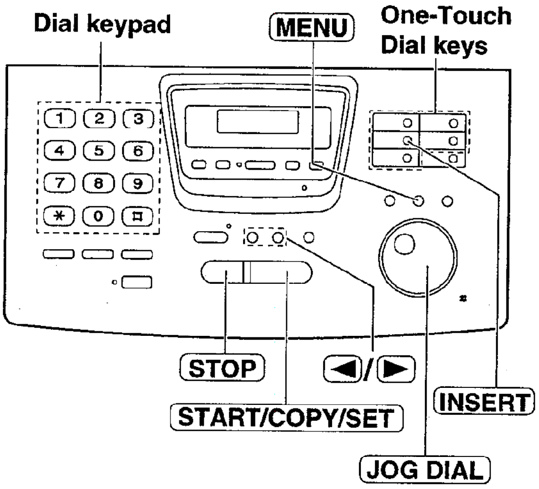
Single sheet:
45 to 90 g/m^2 (12 to 24 lb.)
Multiple sheets:
60 to 75 g/m^2 (16 to 20 lb.)

Recording paper weight

60 to 90 g/m^2 (16 to 24 lb.)
75 g/m^2 (20 lb.)... up to 150 sheets

5. SETTING YOUR LOGO

The logo can be a company, division or name.



(1) Press **MENU**.

Display: `SYSTEM SET UP`

(2) Press **#**, then **0** **2**.

`YOUR LOGO`

(3) Press **START/COPY/SET**.

`LOGO=`

(4) Enter your logo, up to 30 characters, by using the dial keypad or **JOG DIAL**.
For example, when entering "Bill" as your logo:

1. Press **2** twice.

`LOGO=B`

Cursor

2. Press **4** six times.

`LOGO=Bi`

3. Press **5** six times.

`LOGO=Bil`

4. Press **►** to move the cursor to the next space and press **5** six times.

`LOGO=Bill`

(5) Press **START/COPY/SET**.

`SYSTEM SET UP`

(6) Press **MENU**.

To correct a mistake

- Use **◄** or **►** to move the cursor to the incorrect character, then make the correction.

To delete a character

- Move the cursor to the character you want to delete and press **STOP**.

To insert a character

1. Use **◄** or **►** to move the cursor to the position to the right of where you want to insert the character.
2. Press **INSERT** (One-Touch Dial key 2) to insert a space and enter the character.

• To select characters with the dial keypad

Pressing the dial keys will select a character as shown below.

Keys		Characters
Dial Keys	1	1 [ ] { } + - / = , . _ ' : ; ? |
	2	A B C a b c 2
	3	D E F d e f 3
	4	G H I g h i 4
	5	J K L j k l 5
	6	M N O m n o 6
	7	P Q R S p q r s 7
	8	V U T t u v 8
	9	W X Y Z w x y z 9
	0	0 ( ) < > ! " # $ % & ¥ * 1 @ ' →
One-Touch Dial keys	1	**HYPHEN** key (Used to insert a hyphen.)
	2	**INSERT** key (Used to insert one character or one space.)
Arrow keys	◄ ▼ ▼	◄ key (Used to move the cursor to the left.)
	▲ ► ▲	◄ key (Used to move the cursor to the right.) To enter another character using the same number key, move the cursor to the next space.

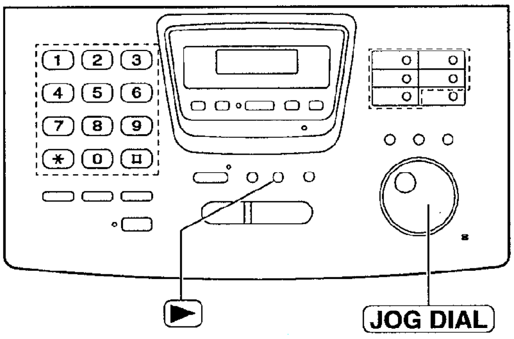
Note:

A hyphen entered in a telephone number is counted as two digits.

• To select characters using the JOG DIAL

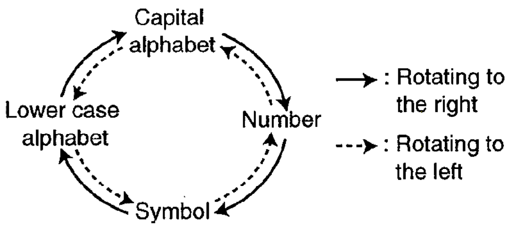
Instead of pressing the dial keys, you can select characters using the JOG DIAL.

1. Rotate (JOG DIAL) until the desired character is displayed.
2. Press (►) to move the cursor to the next space.
   - The character displayed in step 1 is inserted.
3. Return to step 1 to enter the next character.



1 2 3
4 5 6
7 8 9
* 0 #
►
JOG DIAL

Displayed order of characters



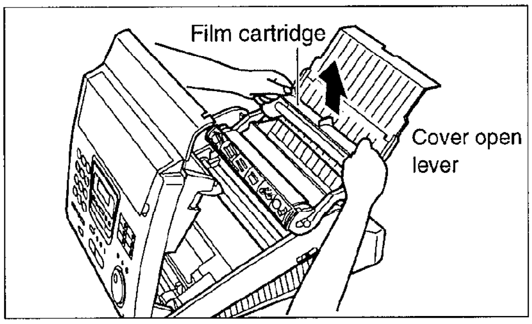
Capital alphabet
Number
Symbol
Lower case alphabet
→ : Rotating to the right
---→ : Rotating to the left

6. REPLACING THE FILM OR FILM CARTRIDGE

When the unit detects the end of the film, the following message will be displayed.

`FILM NEAR EMPTY`	The remaining film prints about 15 pages of letter size documents. Prepare a new film or film cartridge.
`FILM EMPTY`	The film is empty. Install a new film or film cartridge.

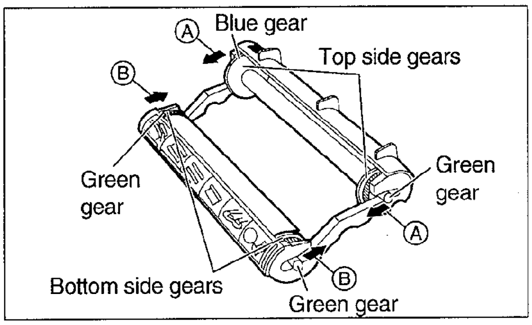
- For film and film cartridge information, refer to page 9.


Film cartridge
Cover open lever

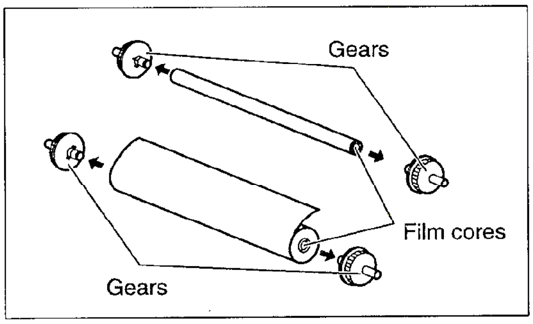
(1) Slide the cover open lever forward.

(2) The cover is under tension to improve print quality. Pull up hard enough to open.

(3) Remove the film cartridge.
- If you have purchased a film cartridge (Part no. KX-FA135) for replacement, skip to step 10.
- To replace only the film (Part no. KX-FA136), go to step 4.

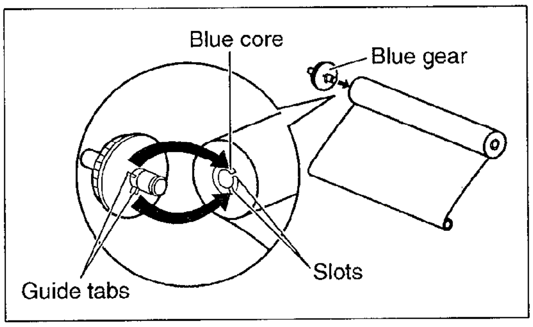

Ⓐ
Blue gear
Top side gears
Ⓑ
Green gear
Green gear
Ⓐ
Bottom side gears
Ⓑ
Green gear

(4) Unlock the four gears by (Ⓐ) pulling the top side gears (blue and green gears) forward and (Ⓑ) pushing back the bottom side gears (green gears). Remove the used film.

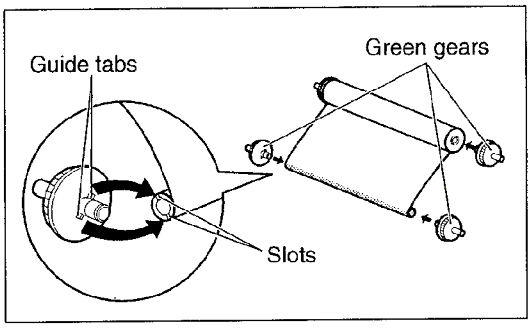

Gears
Film cores
Gears

(5) Remove the four gears from the used film cores.

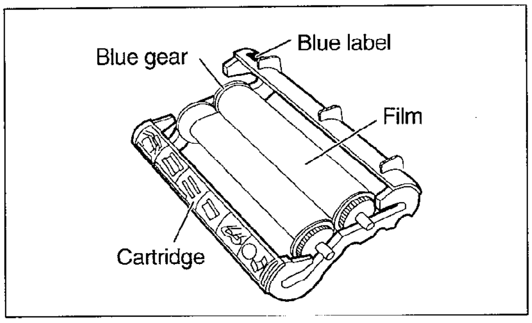
Caution:
- The film is not reusable. You can order a new film for replacement through your nearest Panasonic dealer.


Blue core
Blue gear
Guide tabs
Slots

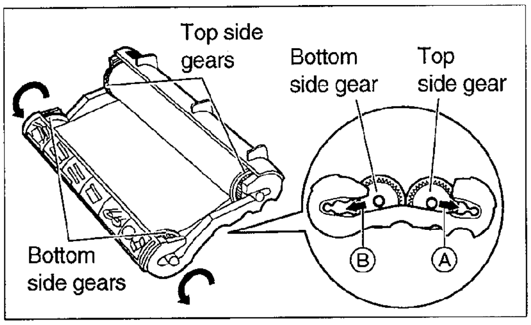
(6) Insert the blue gear into the blue core of the new film.


Guide tabs
Green gears
Slots

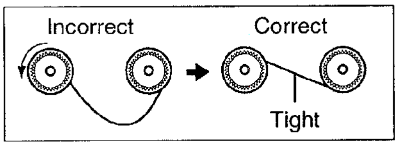
(7) Insert the three green gears into the remaining cores of the new film.

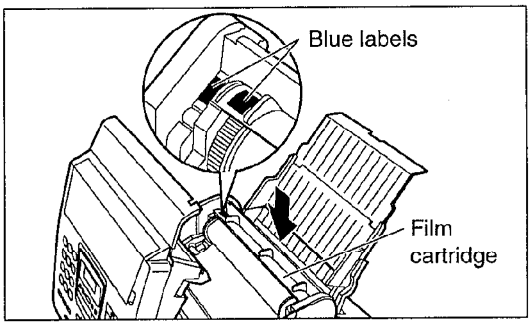

Blue gear
Blue label
Film
Cartridge

(8) Insert the film into the cartridge so that the blue gear matches the blue label on the cartridge.
•The shiny side should be facing up.


Top side gears
Bottom side gear
Top side gear
Bottom side gears
Ⓑ
Ⓐ

(9) Lock the four gears of the film by (Ⓐ) pushing back the top side gears and (Ⓑ) pulling the bottom side gears forward until they click into place.
- If the film is slack, tighten it by winding the bottom side gears.


Incorrect
Correct
Tight


Blue labels
Film cartridge

(10) Insert the film cartridge by matching the blue label on the cartridge with the one on the unit.

(11) Close the cover securely by pushing down on both corners.
- The unit will check if the film is installed correctly. The following message will be displayed.

Display: `PLEASE WAIT`

- If the following message is displayed, the film is not inserted correctly in the cartridge.

`CHECK FILM`

Reinsert it correctly.

•How much film you have left

To check the amount of remaining film, press **(FILM REMAINING)** while the unit is idle. The display indicates the approximate amount of remaining film.

Display: `FILM  E_▂▃▄▅F`

↓

`FILM  E_      F` When the film indicator points to this position, the remaining film will print up to 25 pages of letter size documents. Prepare a new film or film cartridge for replacement.

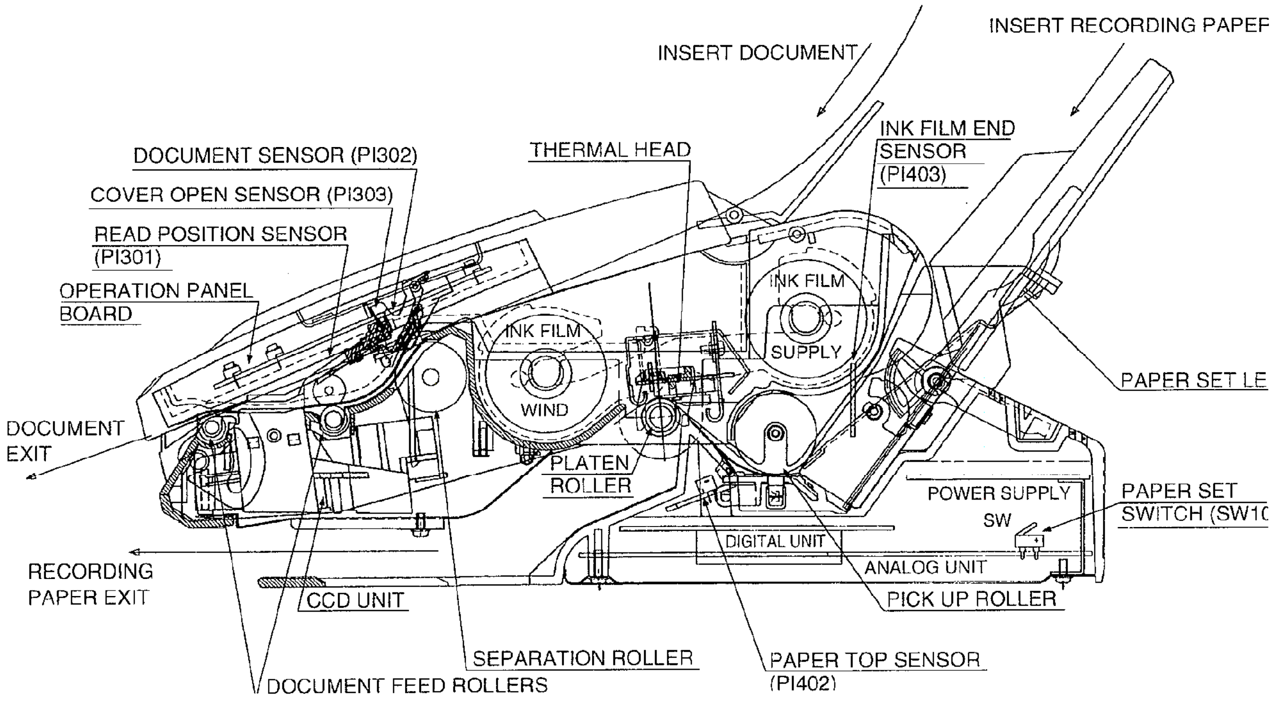
MAINTENANCE ITEMS AND COMPONENT LOCATIONS

1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

1) **Periodic maintenance**
   Inspect the equipment periodically and if necessary, clean any contaminated parts.
2) **Check for breakdowns**
   Look for problems and consider how they arose.
   If the equipment can be still used, perform copying, self testing or communication testing.
3) **Check equipment**
   Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, receiver or the telephone line.
4) **Determine causes**
   Determine the causes of the equipment problem by troubleshooting.
5) **Equipment repairs**
   Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem will not recur.
6) **Confirm normal operation of the equipment**
   After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.
7) **Record keeping**
   Make a record of the measures taken to rectify the problem for future reference.

2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS


INSERT DOCUMENT
INSERT RECORDING PAPE
INK FILM END SENSOR (PI403)
DOCUMENT SENSOR (PI302)
THERMAL HEAD
COVER OPEN SENSOR (PI303)
READ POSITION SENSOR (PI301)
OPERATION PANEL BOARD
INK FILM
SUPPLY
INK FILM
WIND
PAPER SET LE
DOCUMENT EXIT
PLATEN ROLLER
POWER SUPPLY SW
PAPER SET SWITCH (SW1
DIGITAL UNIT
ANALOG UNIT
RECORDING PAPER EXIT
CCD UNIT
PICK UP ROLLER
SEPARATION ROLLER
PAPER TOP SENSOR (PI402)
DOCUMENT FEED ROLLERS

2.1 MAINTENANCE LIST

NO.	OPERATION	CHECK	REMARKS
1	Document Path	Remove any foreign matter such as paper.	———
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	See page 24.
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper and film cartridge before cleaning.	———
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	See pages 24 and 123.
5	Target Glass, White Plate	If the target glass and white plate are dirty, clean the glass with a soft dry cloth.	See page 24.
6	Sensors	Document sensor (PI302), Read position sensor (PI301), Hook switch (SW401), Paper top sensor (PI402), Film end sensor (PI403), Cover open sensor (PI303) and Paper set switch (SW101). Confirm the operation of the sensors.	See pages 22 or 87, and 157.
7	Mirrors and Lens	If the mirrors and lens are dirty, clean them with a soft dry cloth.	———
8	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	———

2.2 MAINTENANCE CYCLE

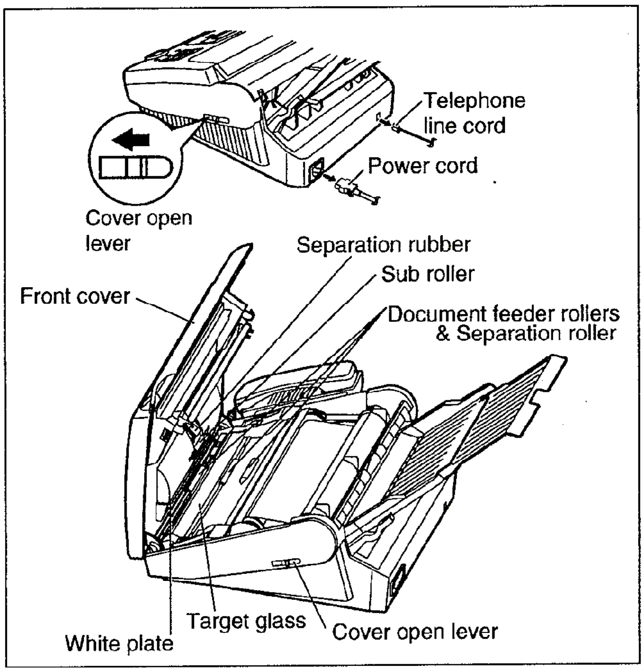
		Cleaning		Replacement	
No.	Item	Cycle	Procedure	Cycle	Procedure
1	Separation Roller (Ref. No. 142)	3 months	See p. 24.	7 years (100,000 documents)	See p. 129.
2	Separation Rubber (Ref. No. 59)	3 months	See p. 24.	7 years (100,000 documents)	See p. 124.
3	Feed Rollers (Ref. No. 135,139)	3 months	See p. 24.	7 years (100,000 documents)	See p. 130.
4	Target Glass, White plate (Ref. No. 201,56)	3 months	See p. 24.	7 years (100,000 documents)	See p. 198, 202
5	Thermal Head (Ref. No. 69)	3 months	See p. 24.	7 years (100,000 documents)	See p. 123.
6	Platen Roller (Ref. No. 133)	3 months	See p. 130.	7 years (100,000 documents)	See p. 130.

These values are only standard ones and may vary depending on usage conditions.

3. MAINTENANCE

3.1 CLEANING THE DOCUMENT FEEDER UNIT

If misfeeding occurs frequently or if dirty patterns or black bands appear on a copied or transmitted document, clean the document feeder rollers, sub roller, separation rubber flap, white plate and target glass.


Telephone line cord
Power cord
Cover open lever
Separation rubber
Sub roller
Front cover
Document feeder rollers & Separation roller
White plate
Target glass
Cover open lever

(1) Disconnect the power cord and telephone line cord.

(2) Slide the cover open lever forward to unlock the cover.

(3) The cover is under tension to improve print quality.
Pull up hard enough to open.

(4) Clean the document feeder rollers, sub roller, separation rubber and separation roller with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.

(5) Clean the white plate and the target glass with a soft dry cloth.

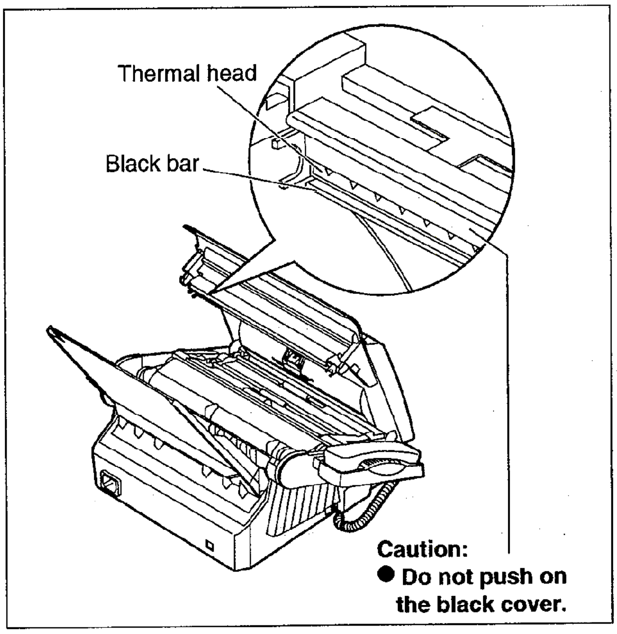
(6) Close the cover securely by pushing down on both corners.

(7) Connect the power cord and telephone line cord.

Caution: Do not use paper products, such as paper towels or tissues, to clean the inside of the unit.

3.2 CLEANING THE THERMAL HEAD AND BLACK BAR

If dirty patterns or black or white bands appear on a copied or received document, clean the thermal head and black bar.


Thermal head
Black bar
Caution:
● Do not push on the black cover.

(1) Disconnect the power cord and telephone line cord.

(2) Slide the cover open lever forward.

(3) The cover is under tension to improve print quality.
Pull up hard enough to open.

(4) Clean the thermal head and black bar with a cloth moistened with isopropyl rubbing alcohol, and let dry thoroughly.

(5) Close the cover securely by pushing down on both corners.

(6) Connect the power cord and telephone line cord.

Caution: To prevent a malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your fingers.

3.3 CLEANING THE PICK UP ROLLER ....Refer to page 129.

TROUBLESHOOTING GUIDE

Page
1. Troubleshooting Summary 26
    1.1 Troubleshooting 26
    1.2 Precautions 26
    1.3 When you don't know how to operate the unit,use the Help function 26
2. User Recoverable Errors 27, 28
3. Troubleshooting Details .... 29~91
    3.1 Outline 29
    3.2 Starting Troubleshooting 29
    3.3 Troubleshooting Items Table 30
4. Programming and Lists .... 92~104
5. Test Functions .... 105~110

1. TROUBLESHOOTING SUMMARY

1. 1 TROUBLESHOOTING

After confirming the problem by asking the user, troubleshoot according to the instructions and observe the following precautions.

1. 2 PRECAUTIONS

1) If there is a problem with the print quality or the paper feed, first check if the installation space and the print paper meets the specifications, the paper selection lever/paper thickness lever is set correctly, and the paper is set correctly without any slack.
2) Before troubleshooting, first check that the connectors and cables are connected correctly (not loose). If the problem occurs randomly, check it very carefully.
3) When connecting the AC power cord with the unit and checking the operation, exercise utmost care when handling electric parts in order to avoid electric shocks and short-circuits.
4) After troubleshooting, double check that you have not forgotten any connectors, left any loose screws, etc.
5) Always test to verify that the unit is working normally.

1. 3 WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE *HELP* FUNCTION

- How to use: 1. Press (HELP).

  2. Press (▲) or (▼) until the desired item is displayed.

  3. Press (START/COPY/SET).

2. USER RECOVERABLE ERRORS

If the unit detects a problem, one or more of the following messages will appear on the display.

DISPLAY MESSAGE	CAUSE AND REMEDY
CALL SERVICE	• There is something wrong with the unit. Contact our service personnel. [This error is displayed when the thermal head does not warm up. Check the thermistor on the thermal head and connector lead. (for technicians)]
CHECK COVER	• The cover is open. Close it.
CHECK DOCUMENT	• The document is not fed into the unit properly. Reinsert the document. If misfeeding occurs frequently, clean the document feeder rollers and try again. If the problem remains, adjust the feeder pressure. (Refer to page 113.)
CHECK FILM	• The film cartridge is not inserted properly. Reinsert it correctly.
CHECK LEVER	• The recording paper set lever is released. Push it back to set the lever.
CHECK MEMORY	• Memory (telephone numbers, parameters, etc.) has been erased. Re-program. [The backup battery on the top of the digital board may be low or dead, so check it.]
CHECK PAPER	• The recording paper is not installed or the unit ran out of paper. Install paper. • The recording paper is not fed into the unit properly or has jammed near the recording paper entrance. Clear the jammed paper. Do not install folded or heavily curled paper in the paper tray.
FAX IN MEMORY	• The unit has (a) document(s) in memory. See the other message's instructions to print out the document(s).
FAX MEMORY FULL	• Memory is full of received documents due to lack of recording paper or a recording paper jam, etc. Install paper or clear the jammed paper. • When performing memory transmission, the document being stored exceeds the memory capacity of the unit. Transmit the entire document by using manual or automatic transmission.
FILM EMPTY	• The film is empty. Replace the film or film cartridge with a new one. • The film is slack. Tighten it and install again.
FILM NEAR EMPTY	• The remaining film can print about 15 pages of letter size documents. Prepare a new film or film cartridge.
FREE FILM EMPTY	• The free starter film is empty. Replace the film or film cartridge with a new one.
JOG-DIAL FULL	• There is no space to store new stations in the JOG DIAL directory. Edit or erase unnecessary stations.
LOADING ERROR	• A loading error occurred while receiving IQ-data from faxSĀV®. • This service is only available in the United States. [Refer to page 8 for details on the faxSĀV® service.]
MESSAGE FULL	• There is no room left in memory to record a voice message. Erase some of all of the messages.
NO FAX REPLY	• The other party's fax machine is busy or ran out of recording paper. Try again.
PAPER JAMMED	• A recording paper jam occurred under the film cartridge. Clear the jammed paper. [If the printout jams, please refer to Fig. a on the next page.]

Trademark
faxSĀV is a registered trademark of FaxSav Incorporated.

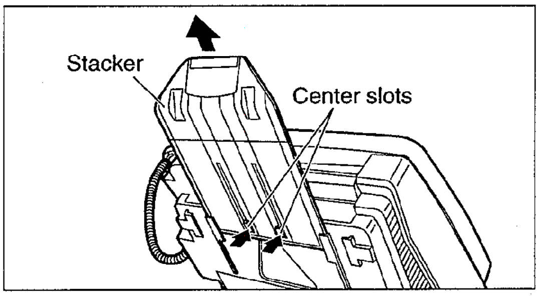
KX-FP270

DISPLAY MESSAGE	CAUSE AND REMEDY
PLEASE WAIT	• The unit is checking if the film is set correctly. Wait for a while.
REDIAL TIME OUT	• The other party's fax machine is busy or ran out of recording paper. Try again.
REMOVE DOCUMENT	• The document is jammed. Remove the jammed document. • Attempted to transmit a document longer than 600 mm ($23^{5}/_{8}$"). Press the STOP button to remove the document. [Alternately, turn off service code #559 to enable sending of documents longer than 600 mm.]
TRANSMIT ERROR	• A transmission error occurred. Try again.
UNIT OVERHEATED	• The unit is too hot. Let the unit cool down. [If many copies are nearly all black, this message will be displayed. When this occurs, open the front cover and let the unit cool down.]
NO TEL LINE	• Refer to page 13.

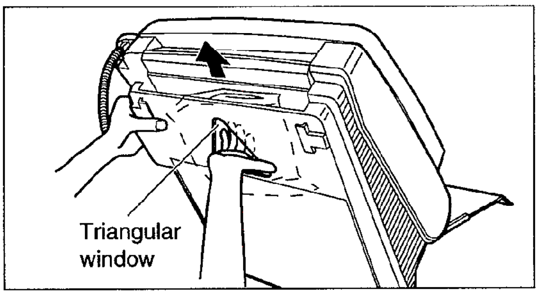
※The explanations given in the [ ] are for servicemen only.

Remove the jammed paper as follows.

① First, lift the front of the unit. Pull the stacker forward until it stops, then press the center slots to unlock and remove the stacker.



② Tilt the unit up and push the jammed recording paper out through the triangular window on the bottom of the unit.



③ Remove the jammed recording paper from the recording paper exit.

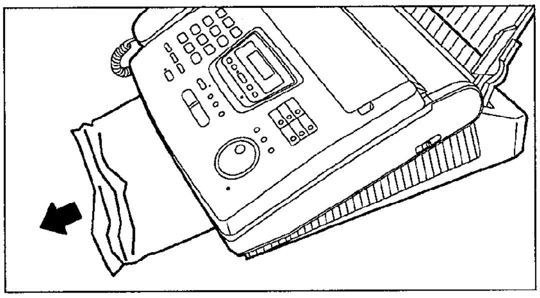


Fig. a

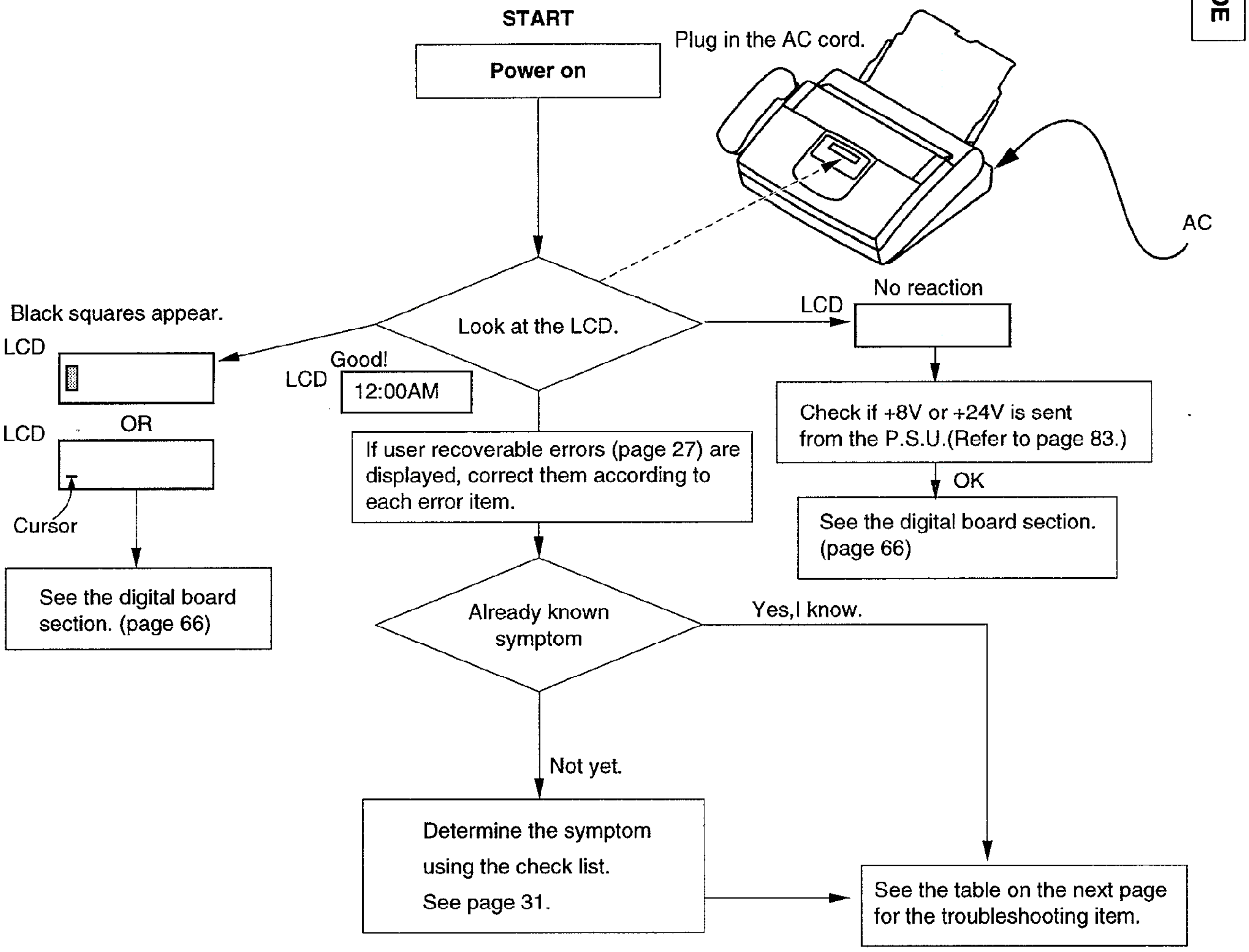
3. TROUBLESHOOTING DETAILS

3.1 OUTLINE

Troubleshooting is for recovering quality and reliability by determining the broken component and replacing, adjusting or cleaning it as required. First, determine the problem then decide the troubleshooting method. If you have difficulty finding the broken part, determine which board is broken. (For example: the Digital PCB, Analog PCB, etc.) The claim tag from a customer or dealer may use different expressions for the same problem, as they are not a technician or engineer. Using your experience, test the problem area corresponding to the claim. Also, returns from a customer or dealer often have a claim tag. For these cases as well, you need to determine the problem. Test the unit using the simple check list on page 31. Difficult problems may be hard to determine, so repeated testing is necessary.

3.2 STARTING TROUBLESHOOTING

Determine the symptom and the troubleshooting method.


START
Power on
Plug in the AC cord.
AC
Look at the LCD.
Black squares appear.
LCD
OR
LCD
Cursor
See the digital board section. (page 66)
Good!
LCD
12:00AM
If user recoverable errors (page 27) are displayed, correct them according to each error item.
No reaction
LCD
Check if +8V or +24V is sent from the P.S.U.(Refer to page 83.)
OK
See the digital board section. (page 66)
Already known symptom
Yes,I know.
Not yet.
Determine the symptom using the check list. See page 31.
See the table on the next page for the troubleshooting item.

3.3 TROUBLESHOOTING ITEMS TABLE

ITEM	SYMPTOM	SEE THIS PAGE.
ADF (Auto Document Feeder)	The document does not feed.	32
	Document jam	33
	Multiple feed	34
	Skew	35
Recording paper feed	The recording paper does not feed.	36
	Paper jam	37
	Multiple feed and skew	37
Printing	The sent fax data is skewed.	38
	The received fax data is skewed.	38
	The received or copied data is expanded.	38
	A blank page is copied.	39
	A blank page is received.	41
	Black or white vertical line	41
	Black or white lateral line	42
	An abnormal image is printed.	43
Communication FAX, TEL (analog board)	Cannot communicate by fax.	44
	An error code is displayed.	44
	Cannot talk.	78
	The DTMF tone doesn't work.	78
	The handset/monitor doesn't work, etc.	78
Operation panel	Keys are not accepted.	86
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	87

3.3.1 Simple Check List

SERIAL NO. DATE

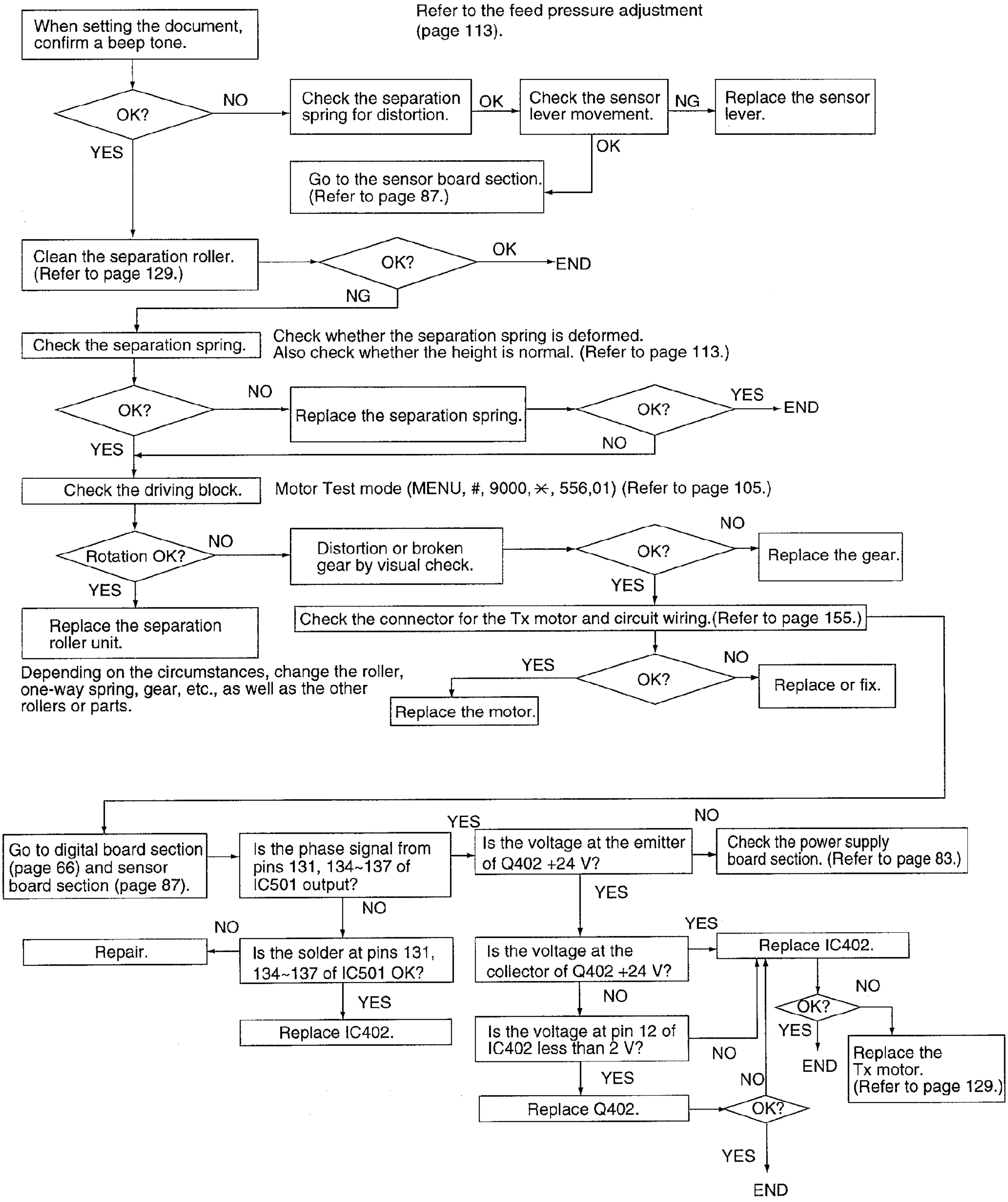
FUNCTION		JUDGEMENT	REFERENCE
FAX operaton	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telephone operation	Handset transceiver/ receiver	OK / NG	
	SP-PHONE sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	VOX detection	OK / NG	Service code 815※
Operation panel	Key check	OK / NG	Service code 561※
	LED check	OK / NG	Service code 557※
	LCD check	OK / NG	Service code 558※
Sensor	Sensor check	OK / NG	Service code 815※
Clock	Sensor check	OK / NG	Is the time kept correctly? Check with another clock.
Digital Speaker phone		OK / NG	
Digital TAM	Greeting Rec/Play	OK / NG	
	Incoming message Rec/Play	OK / NG	
	Memo Rec/Play	OK / NG	
Voice prompt		OK / NG	SERVICE CODE 784 Check whether voice prompt is play or not.

※Check according to the service code referring to the Test function on page 105.

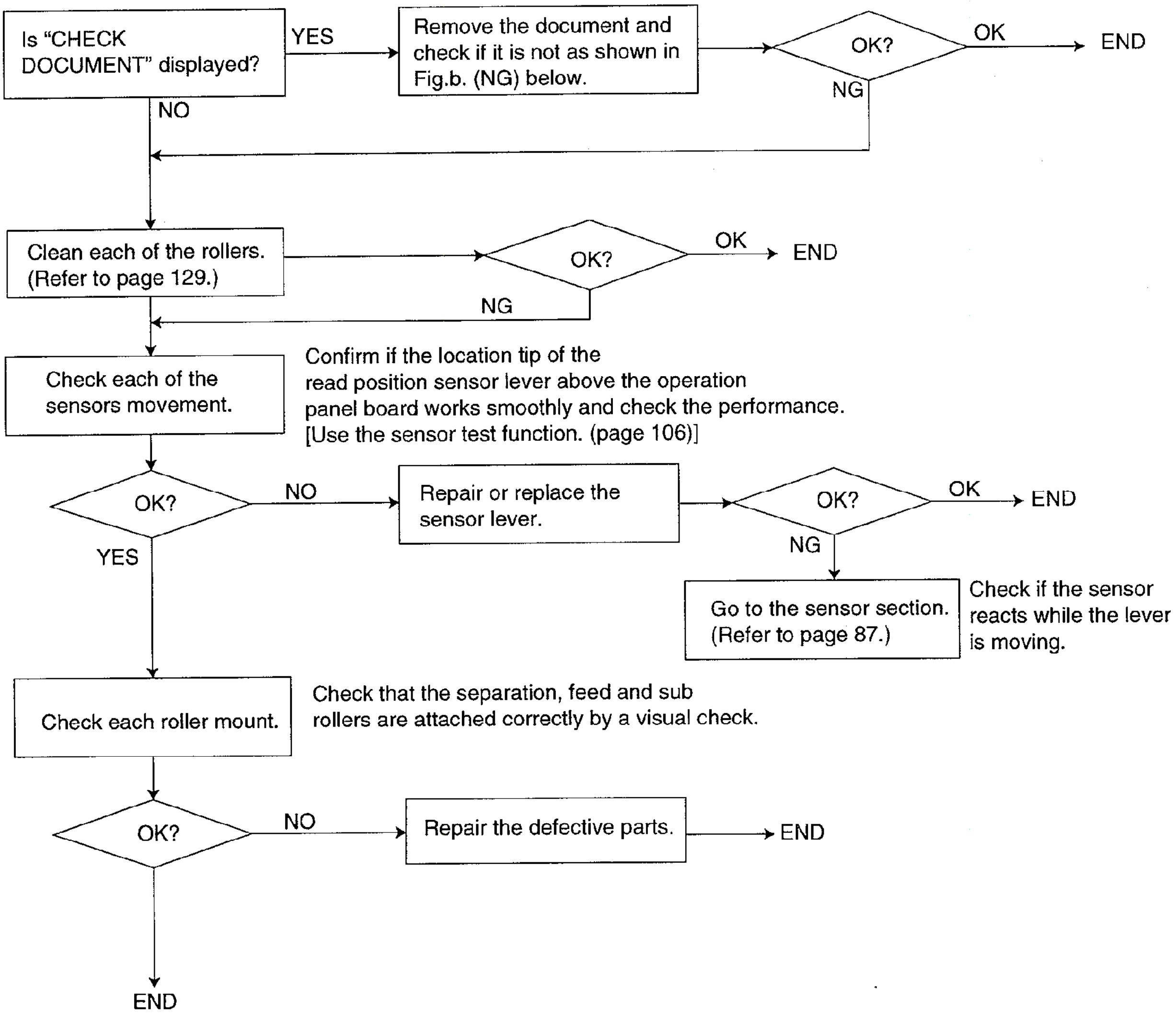
3.3.2 ADF (Auto document feed) section

(1) No document feed

※When using thin paper etc.,
sometimes the document will not feed.
Refer to the feed pressure adjustment
(page 113).


When setting the document, confirm a beep tone.
OK?
NO
YES
Check the separation spring for distortion.
OK
Check the sensor lever movement.
NG
Replace the sensor lever.
OK
Go to the sensor board section. (Refer to page 87.)
Clean the separation roller. (Refer to page 129.)
OK?
OK
END
NG
Check the separation spring.
Check whether the separation spring is deformed.
Also check whether the height is normal. (Refer to page 113.)
OK?
NO
YES
Replace the separation spring.
OK?
YES
END
NO
Check the driving block.
Motor Test mode (MENU, #, 9000, ⋆, 556,01) (Refer to page 105.)
Rotation OK?
NO
YES
Distortion or broken gear by visual check.
OK?
NO
Replace the gear.
YES
Replace the separation roller unit.
Depending on the circumstances, change the roller, one-way spring, gear, etc., as well as the other rollers or parts.
Check the connector for the Tx motor and circuit wiring.(Refer to page 155.)
OK?
YES
NO
Replace the motor.
Replace or fix.
Go to digital board section (page 66) and sensor board section (page 87).
Is the phase signal from pins 131, 134~137 of IC501 output?
YES
Is the voltage at the emitter of Q402 +24 V?
NO
Check the power supply board section. (Refer to page 83.)
NO
NO
Repair.
Is the solder at pins 131, 134~137 of IC501 OK?
YES
Replace IC402.
YES
Is the voltage at the collector of Q402 +24 V?
YES
Replace IC402.
NO
Is the voltage at pin 12 of IC402 less than 2 V?
NO
OK?
NO
YES
END
Replace the Tx motor. (Refer to page 129.)
YES
Replace Q402.
NO
OK?
YES
END

(2) Document JAM


Is "CHECK DOCUMENT" displayed?
YES
Remove the document and check if it is not as shown in Fig.b. (NG) below.
OK?
OK
END
NG
NO
Clean each of the rollers. (Refer to page 129.)
OK?
OK
END
NG
Check each of the sensors movement.
Confirm if the location tip of the read position sensor lever above the operation panel board works smoothly and check the performance. [Use the sensor test function. (page 106)]
OK?
NO
Repair or replace the sensor lever.
OK?
OK
END
NG
Go to the sensor section. (Refer to page 87.)
Check if the sensor reacts while the lever is moving.
YES
Check each roller mount.
Check that the separation, feed and sub rollers are attached correctly by a visual check.
OK?
NO
Repair the defective parts.
END
END

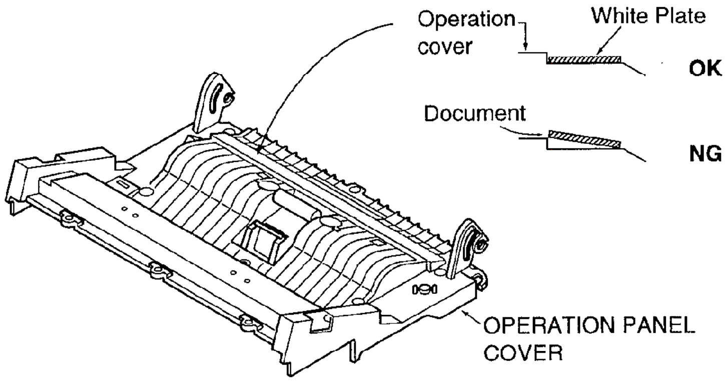
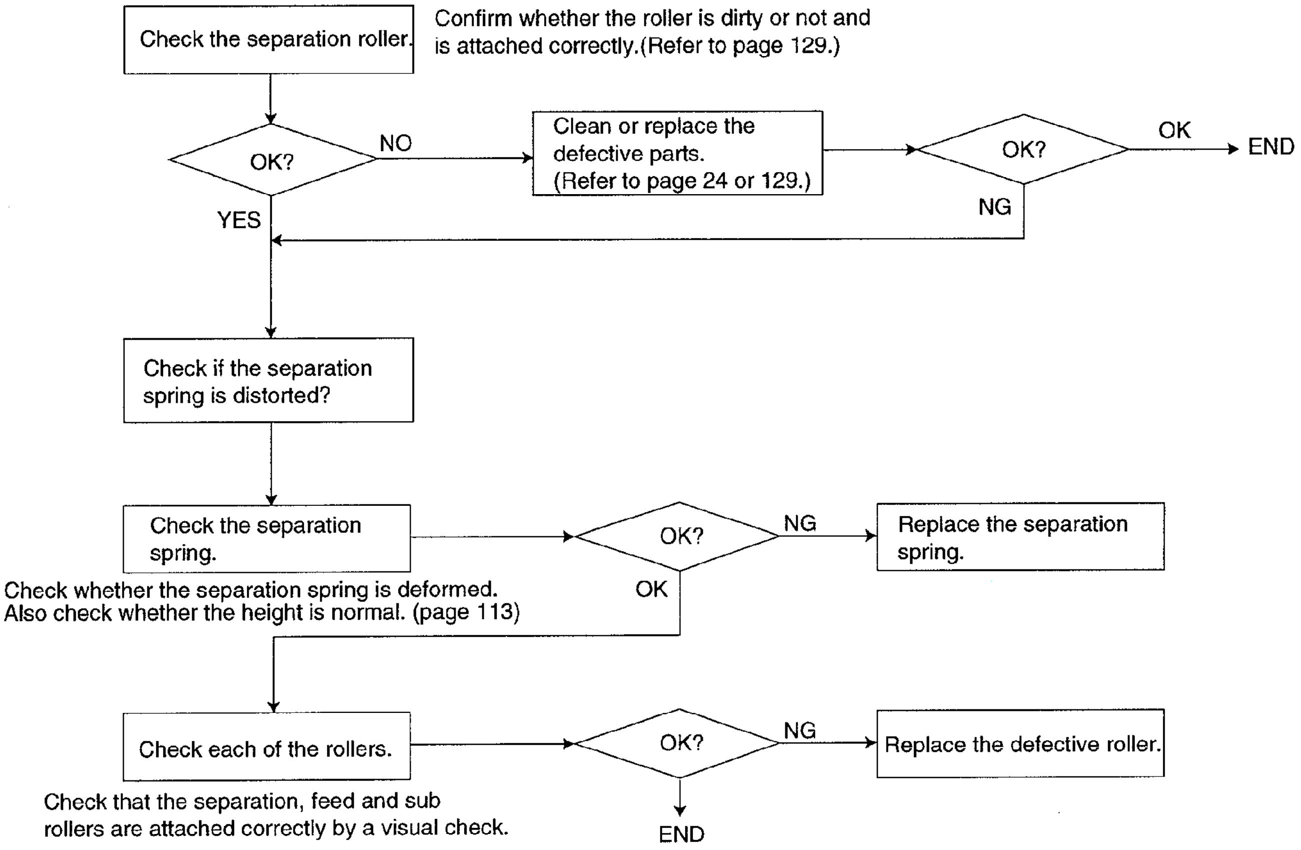

Operation cover
White Plate
OK
Document
NG
OPERATION PANEL COVER

Fig. b

(3) Multiple feed

- When using thick paper etc., sometimes the document will not feed.
  Refer to the feed pressure adjustment (page 113).


Check the separation roller.
Confirm whether the roller is dirty or not and is attached correctly.(Refer to page 129.)
OK?
NO
YES
Clean or replace the defective parts. (Refer to page 24 or 129.)
OK?
OK
END
NG
Check if the separation spring is distorted?
Check the separation spring.
Check whether the separation spring is deformed. Also check whether the height is normal. (page 113)
OK?
NG
OK
Replace the separation spring.
Check each of the rollers.
Check that the separation, feed and sub rollers are attached correctly by a visual check.
OK?
NG
Replace the defective roller.
END

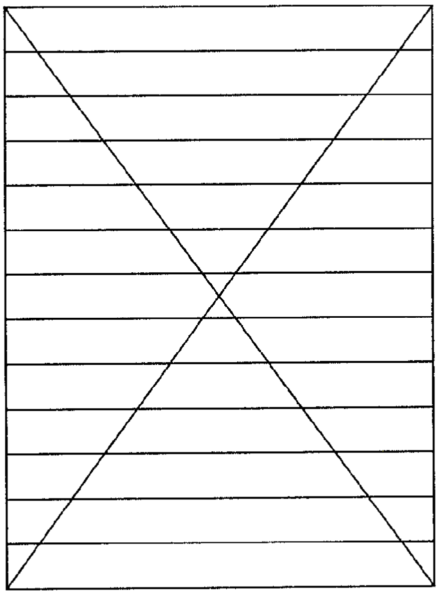
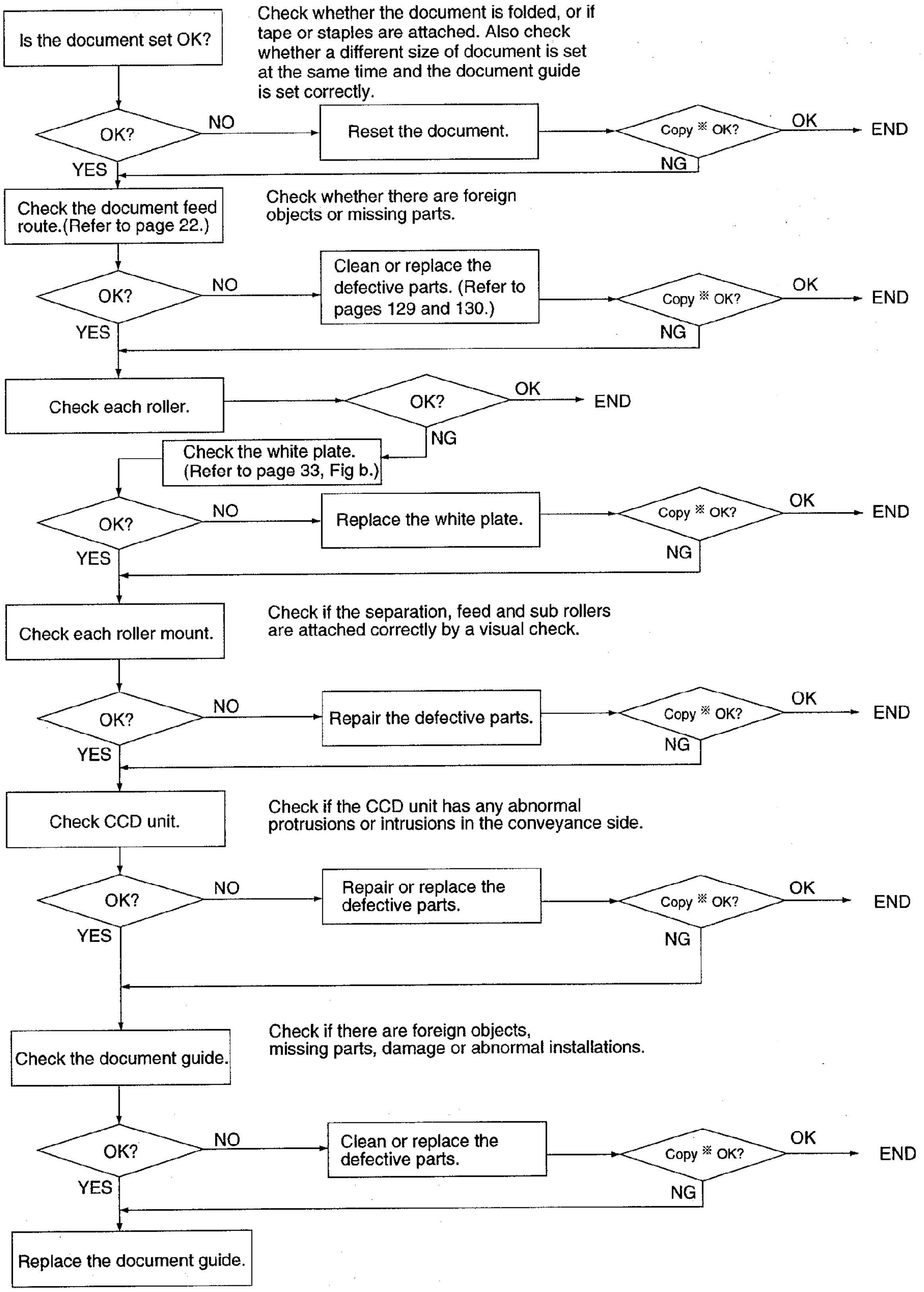


Fig. A

※When confirming if the characters are extended or distorted on, it the feed problem is ocurred, use this kind of test chart.

(4) Skew

※ We recommend making a copy of the Fig. A document on page 34 and using it.


Is the document set OK?
OK?
NO
Reset the document.
Copy ※ OK?
OK
END
NG
YES
Check the document feed route.(Refer to page 22.)
OK?
NO
Clean or replace the defective parts. (Refer to pages 129 and 130.)
Copy ※ OK?
OK
END
NG
YES
Check each roller.
OK?
OK
END
NG
Check the white plate. (Refer to page 33, Fig b.)
OK?
NO
Replace the white plate.
Copy ※ OK?
OK
END
NG
YES
Check each roller mount.
OK?
NO
Repair the defective parts.
Copy ※ OK?
OK
END
NG
YES
Check CCD unit.
OK?
NO
Repair or replace the defective parts.
Copy ※ OK?
OK
END
NG
YES
Check the document guide.
OK?
NO
Clean or replace the defective parts.
Copy ※ OK?
OK
END
NG
YES
Replace the document guide.

Check whether the document is folded, or if tape or staples are attached. Also check whether a different size of document is set at the same time and the document guide is set correctly.

Check whether there are foreign objects or missing parts.

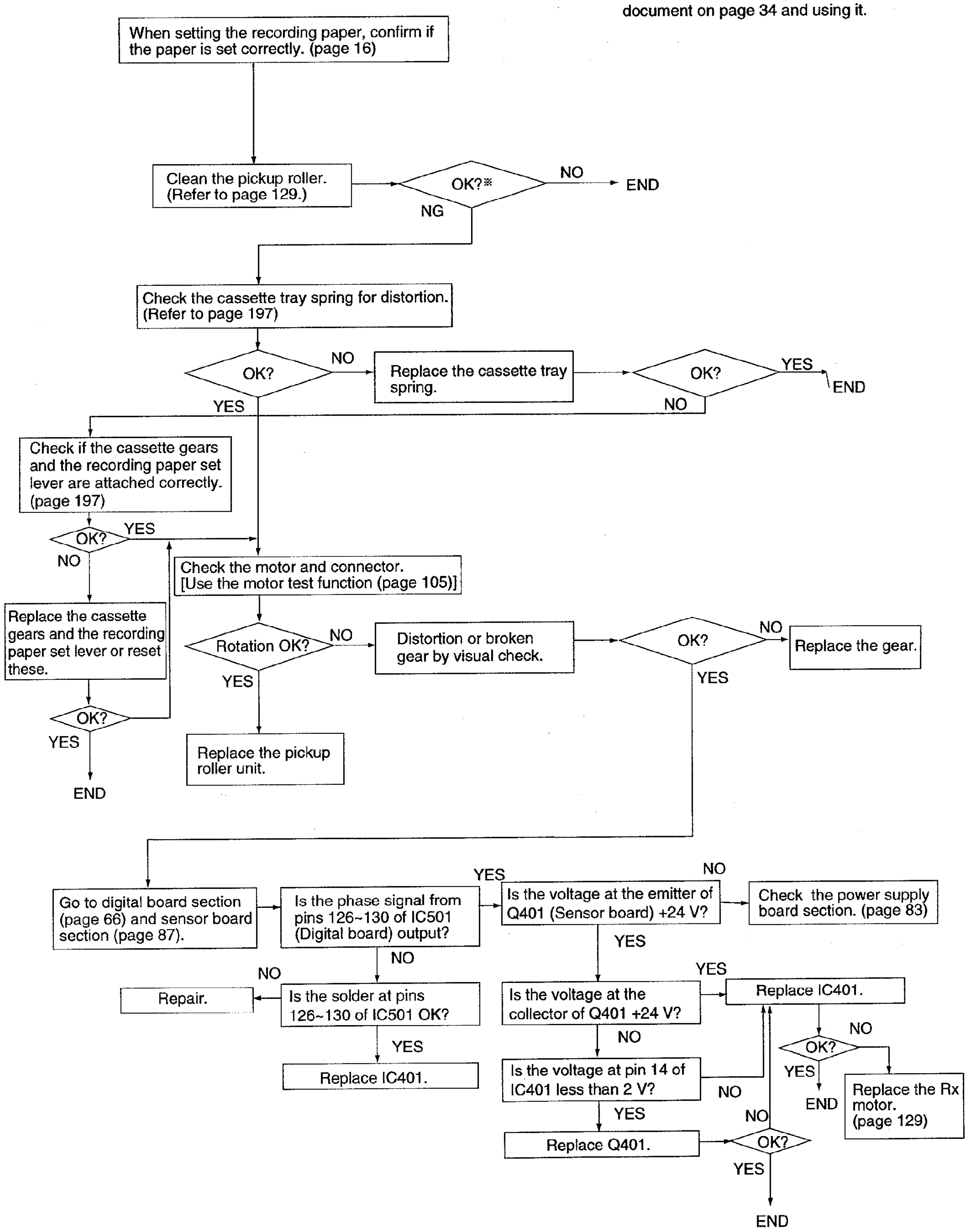
Check if the separation, feed and sub rollers are attached correctly by a visual check.

Check if the CCD unit has any abnormal protrusions or intrusions in the conveyance side.

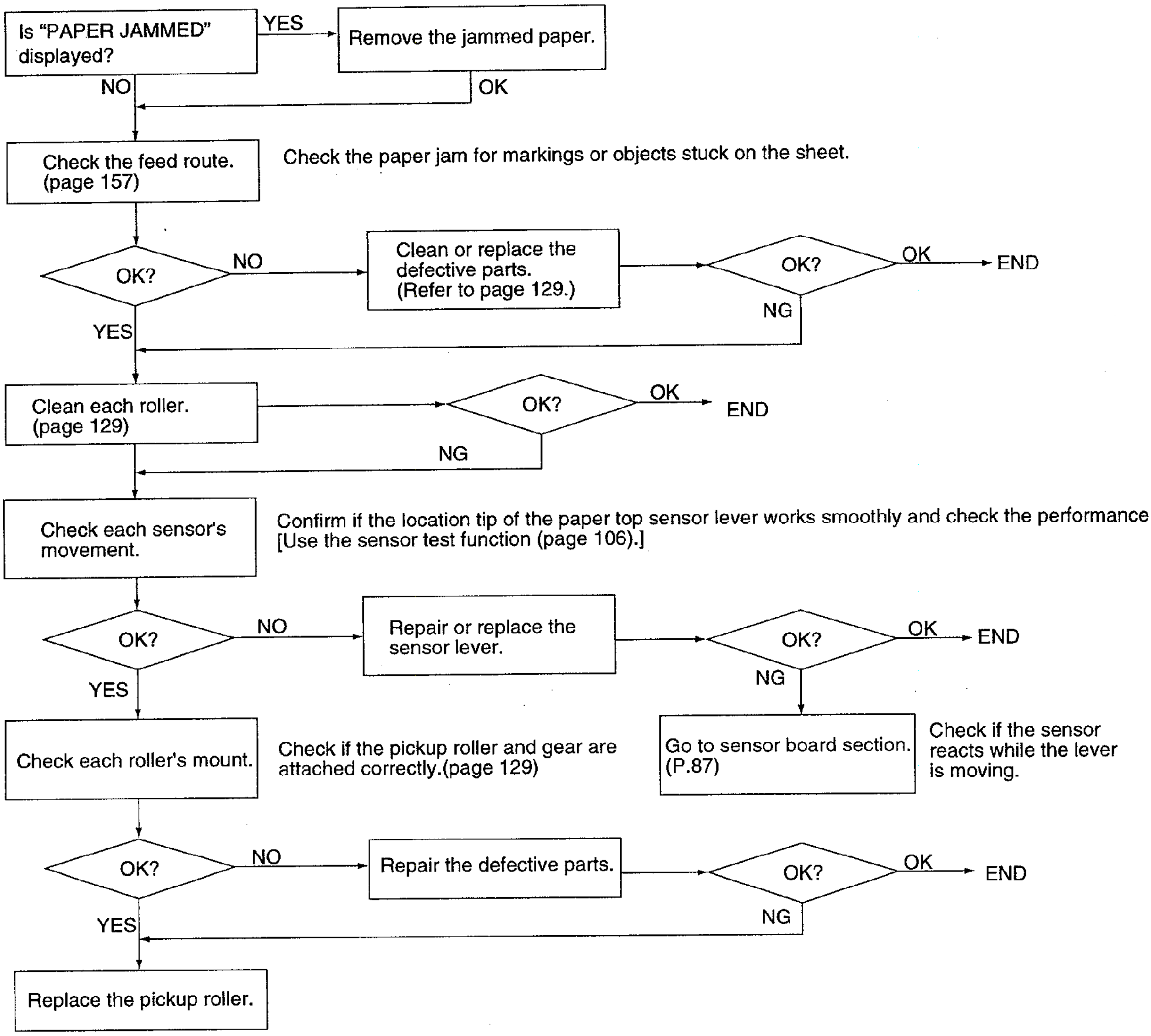
Check if there are foreign objects, missing parts, damage or abnormal installations.

(5) The recording paper does not feed.

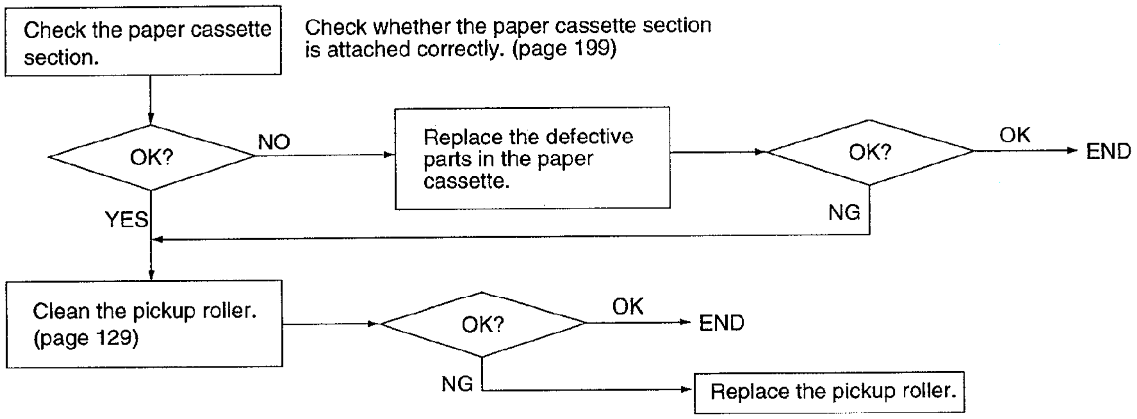
※ We recommend making a copy of the Fig. A document on page 34 and using it.


When setting the recording paper, confirm if the paper is set correctly. (page 16)
Clean the pickup roller. (Refer to page 129.)
OK?※
NO
END
NG
Check the cassette tray spring for distortion. (Refer to page 197)
OK?
NO
Replace the cassette tray spring.
OK?
YES
END
YES
NO
Check if the cassette gears and the recording paper set lever are attached correctly. (page 197)
OK?
YES
NO
Check the motor and connector. [Use the motor test function (page 105)]
Replace the cassette gears and the recording paper set lever or reset these.
Rotation OK?
NO
Distortion or broken gear by visual check.
OK?
NO
Replace the gear.
YES
OK?
YES
END
YES
Replace the pickup roller unit.
Go to digital board section (page 66) and sensor board section (page 87).
Is the phase signal from pins 126~130 of IC501 (Digital board) output?
YES
Is the voltage at the emitter of Q401 (Sensor board) +24 V?
NO
Check the power supply board section. (page 83)
NO
YES
NO
Repair.
Is the solder at pins 126~130 of IC501 OK?
YES
Replace IC401.
Is the voltage at the collector of Q401 +24 V?
YES
Replace IC401.
NO
NO
OK?
YES
END
Replace the Rx motor. (page 129)
Is the voltage at pin 14 of IC401 less than 2 V?
NO
YES
NO
Replace Q401.
OK?
YES
END

(6) Paper JAM

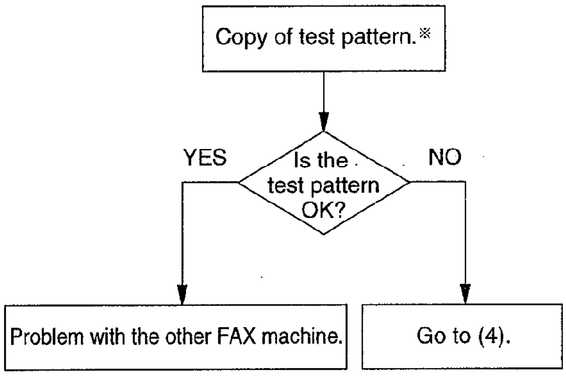

Is "PAPER JAMMED" displayed?
YES
Remove the jammed paper.
NO
OK
Check the feed route. (page 157)
Check the paper jam for markings or objects stuck on the sheet.
OK?
NO
Clean or replace the defective parts. (Refer to page 129.)
OK?
OK
END
NG
YES
Clean each roller. (page 129)
OK?
OK
END
NG
Check each sensor's movement.
Confirm if the location tip of the paper top sensor lever works smoothly and check the performance.
[Use the sensor test function (page 106).]
OK?
NO
Repair or replace the sensor lever.
OK?
OK
END
NG
YES
Check each roller's mount.
Check if the pickup roller and gear are attached correctly.(page 129)
Go to sensor board section. (P.87)
Check if the sensor reacts while the lever is moving.
OK?
NO
Repair the defective parts.
OK?
OK
END
NG
YES
Replace the pickup roller.

(7) Multiple feed and skew

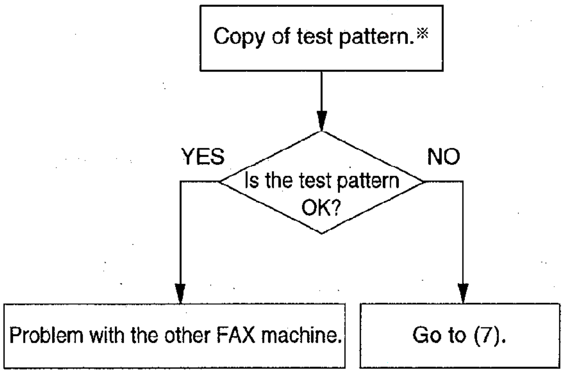

Check the paper cassette section.
Check whether the paper cassette section is attached correctly. (page 199)
OK?
NO
Replace the defective parts in the paper cassette.
OK?
OK
END
NG
YES
Clean the pickup roller. (page 129)
OK?
OK
END
NG
Replace the pickup roller.

※ We recommend making a copy of the Fig. A document on page 34 and using it.

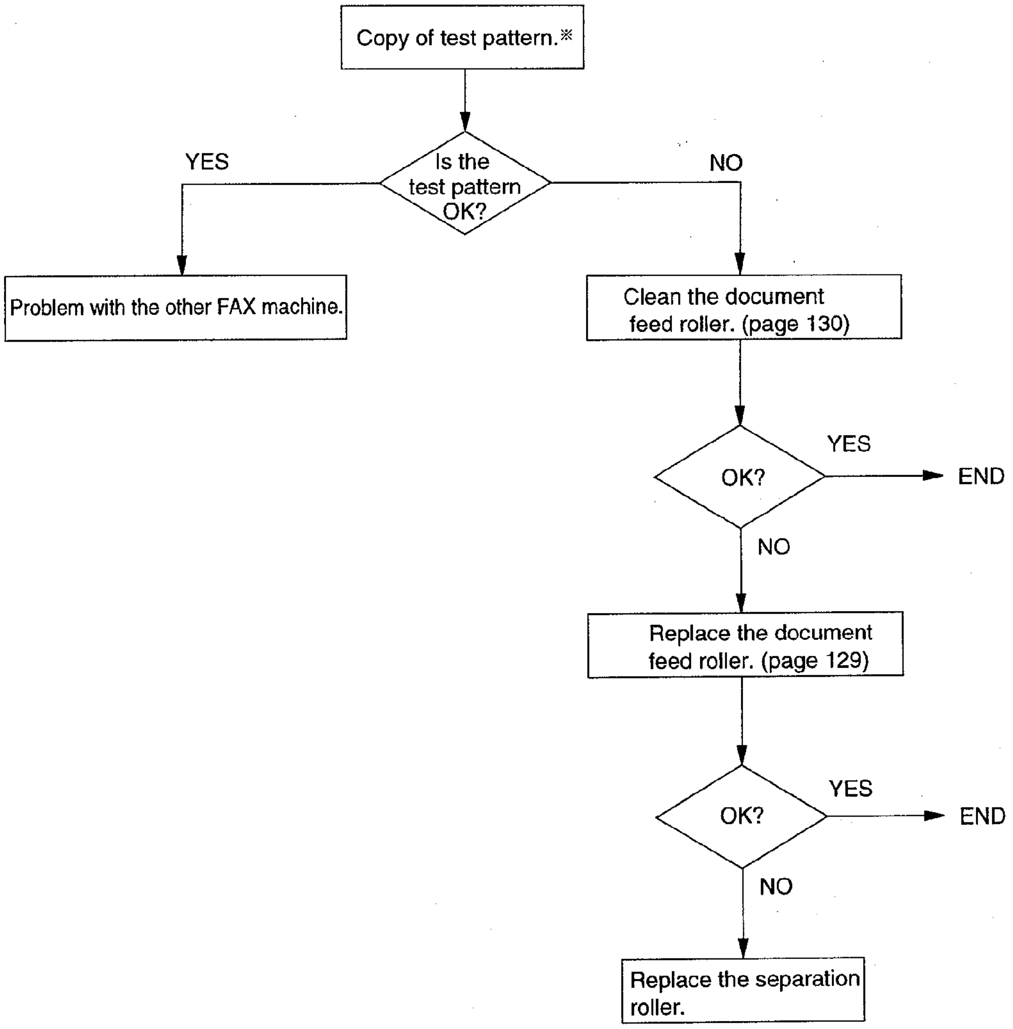
(8) The sent fax data is skewed.


Copy of test pattern.※
Is the test pattern OK?
YES
NO
Problem with the other FAX machine.
Go to (4).

(9) The received fax data is skewed.

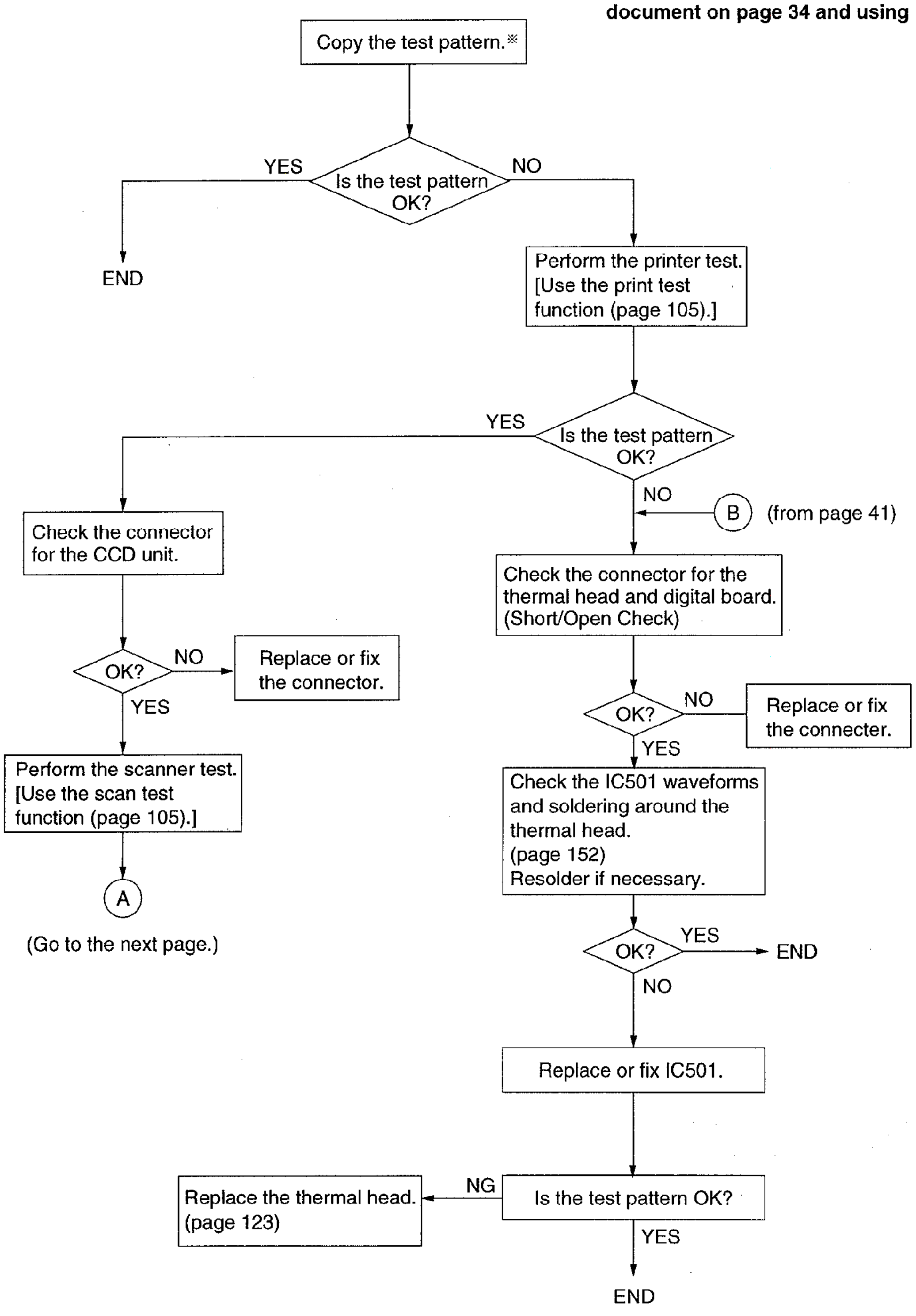

Copy of test pattern.※
Is the test pattern OK?
YES
NO
Problem with the other FAX machine.
Go to (7).

(10) Received or copied data is expanded.

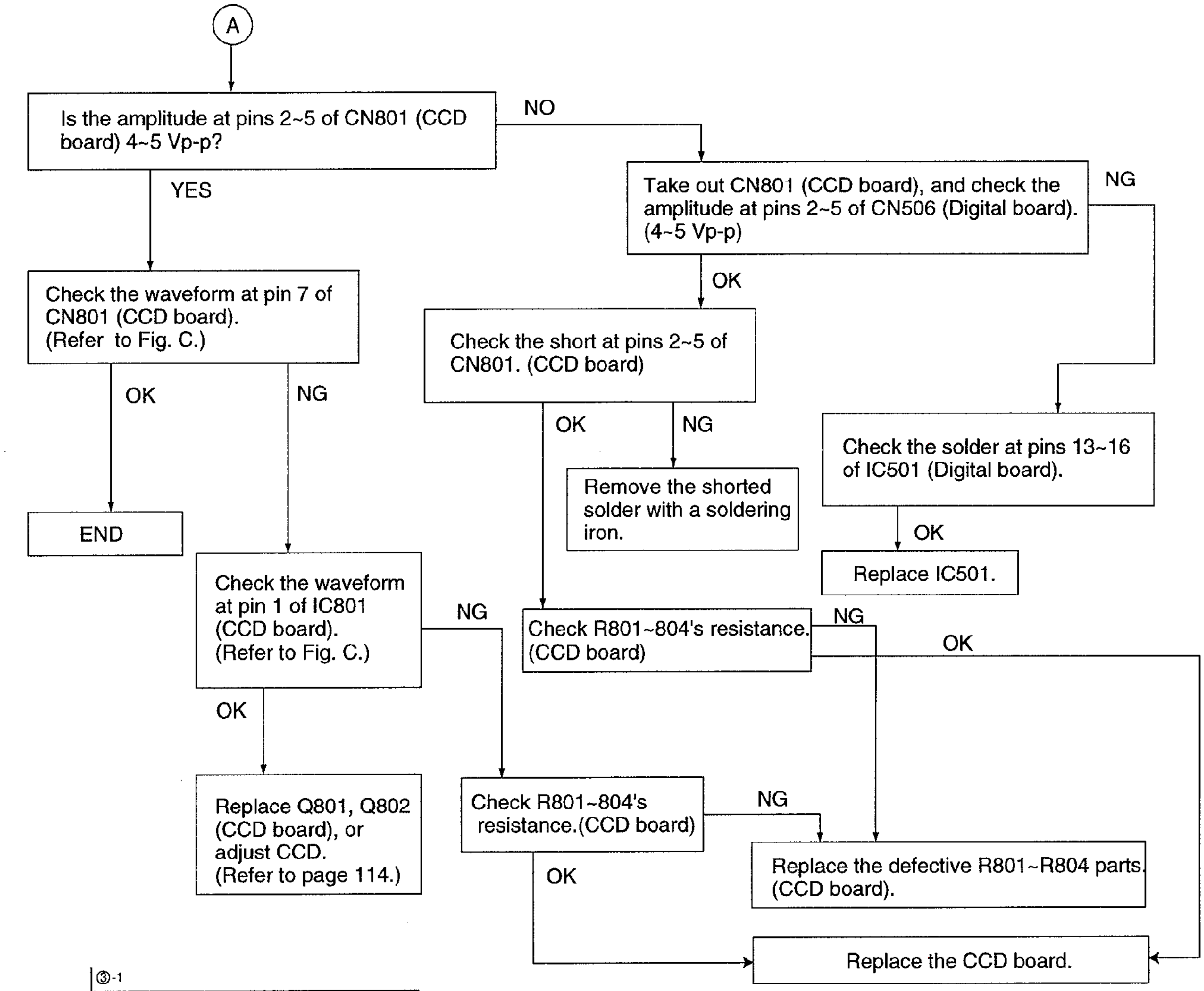

Copy of test pattern.※
Is the test pattern OK?
YES
NO
Problem with the other FAX machine.
Clean the document feed roller. (page 130)
OK?
YES
END
NO
Replace the document feed roller. (page 129)
OK?
YES
END
NO
Replace the separation roller.

(11) A blank page is copied.

※ **We recommend making a copy of the Fig. A document on page 34 and using it.**


Copy the test pattern.※
Is the test pattern OK?
YES
NO
END
Perform the printer test. [Use the print test function (page 105).]
Is the test pattern OK?
YES
NO
B
(from page 41)
Check the connector for the CCD unit.
OK?
NO
Replace or fix the connector.
YES
Perform the scanner test. [Use the scan test function (page 105).]
A
(Go to the next page.)
Check the connector for the thermal head and digital board. (Short/Open Check)
OK?
NO
Replace or fix the connecter.
YES
Check the IC501 waveforms and soldering around the thermal head. (page 152) Resolder if necessary.
OK?
YES
END
NO
Replace or fix IC501.
Is the test pattern OK?
NG
Replace the thermal head. (page 123)
YES
END

(From the previous page)


A
Is the amplitude at pins 2~5 of CN801 (CCD board) 4~5 Vp-p?
NO
YES
Take out CN801 (CCD board), and check the amplitude at pins 2~5 of CN506 (Digital board). (4~5 Vp-p)
NG
OK
Check the waveform at pin 7 of CN801 (CCD board). (Refer to Fig. C.)
Check the short at pins 2~5 of CN801. (CCD board)
OK
NG
OK
NG
Check the solder at pins 13~16 of IC501 (Digital board).
Remove the shorted solder with a soldering iron.
END
OK
Replace IC501.
Check the waveform at pin 1 of IC801 (CCD board). (Refer to Fig. C.)
NG
Check R801~804's resistance. (CCD board)
NG
OK
OK
Replace Q801, Q802 (CCD board), or adjust CCD. (Refer to page 114.)
Check R801~804's resistance.(CCD board)
NG
Replace the defective R801~R804 parts. (CCD board).
OK
Replace the CCD board.

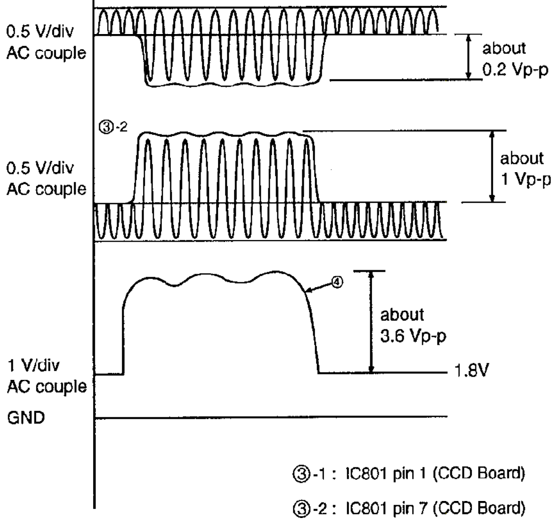
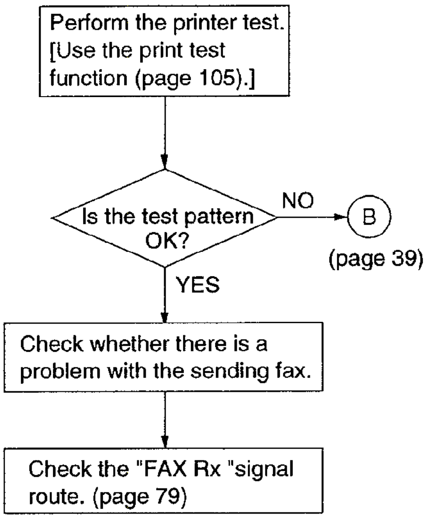

③-1
0.5 V/div
AC couple
about
0.2 Vp-p
③-2
0.5 V/div
AC couple
about
1 Vp-p
④
about
3.6 Vp-p
1 V/div
AC couple
1.8V
GND
③-1 : IC801 pin 1 (CCD Board)
③-2 : IC801 pin 7 (CCD Board)

Fig. C

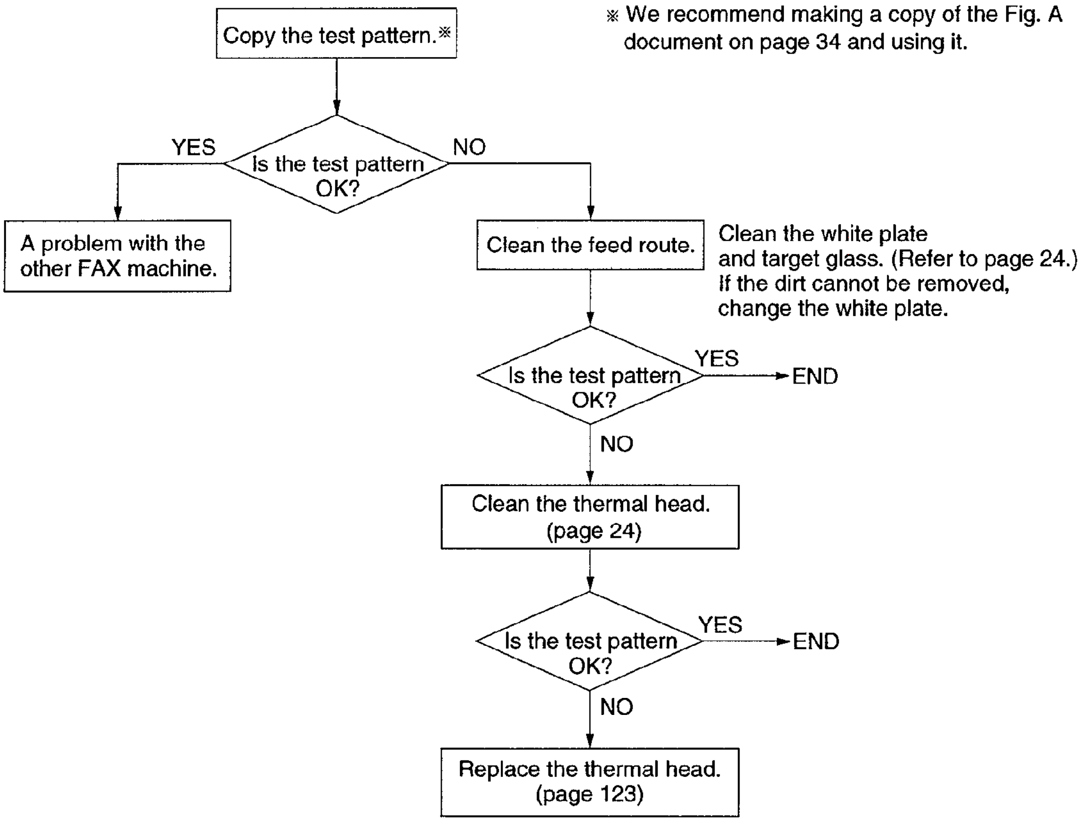
※ When replacing the CCD board, perform the CCD adjustment. (page 114)

(12) A blank page is received.


Perform the printer test. [Use the print test function (page 105).]
Is the test pattern OK?
NO
B
(page 39)
YES
Check whether there is a problem with the sending fax.
Check the "FAX Rx "signal route. (page 79)

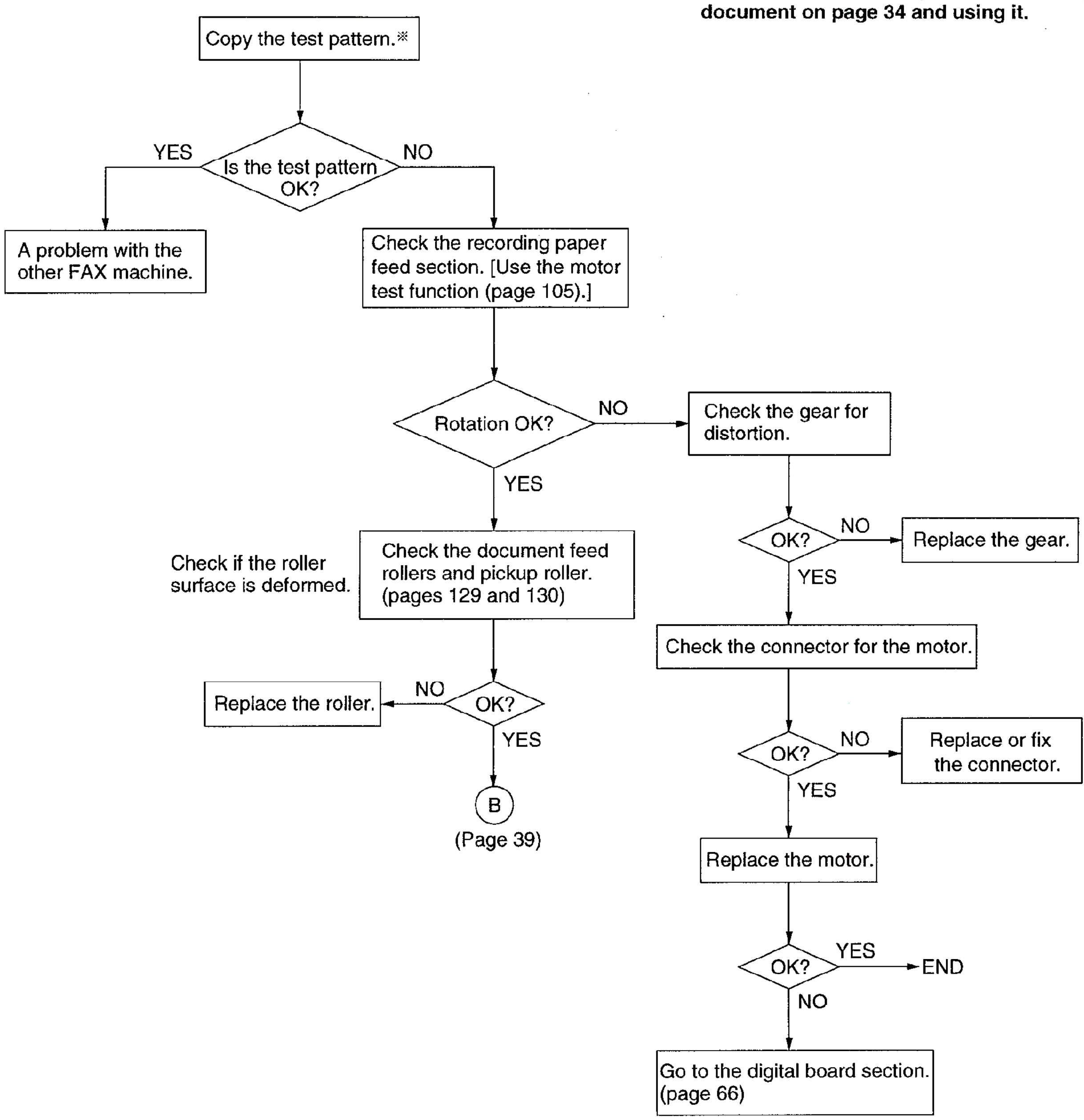
(13) Black or white vertical line

※ We recommend making a copy of the Fig. A document on page 34 and using it.


Copy the test pattern.※
Is the test pattern OK?
YES
NO
A problem with the other FAX machine.
Clean the feed route.
Clean the white plate and target glass. (Refer to page 24.) If the dirt cannot be removed, change the white plate.
Is the test pattern OK?
YES
END
NO
Clean the thermal head. (page 24)
Is the test pattern OK?
YES
END
NO
Replace the thermal head. (page 123)

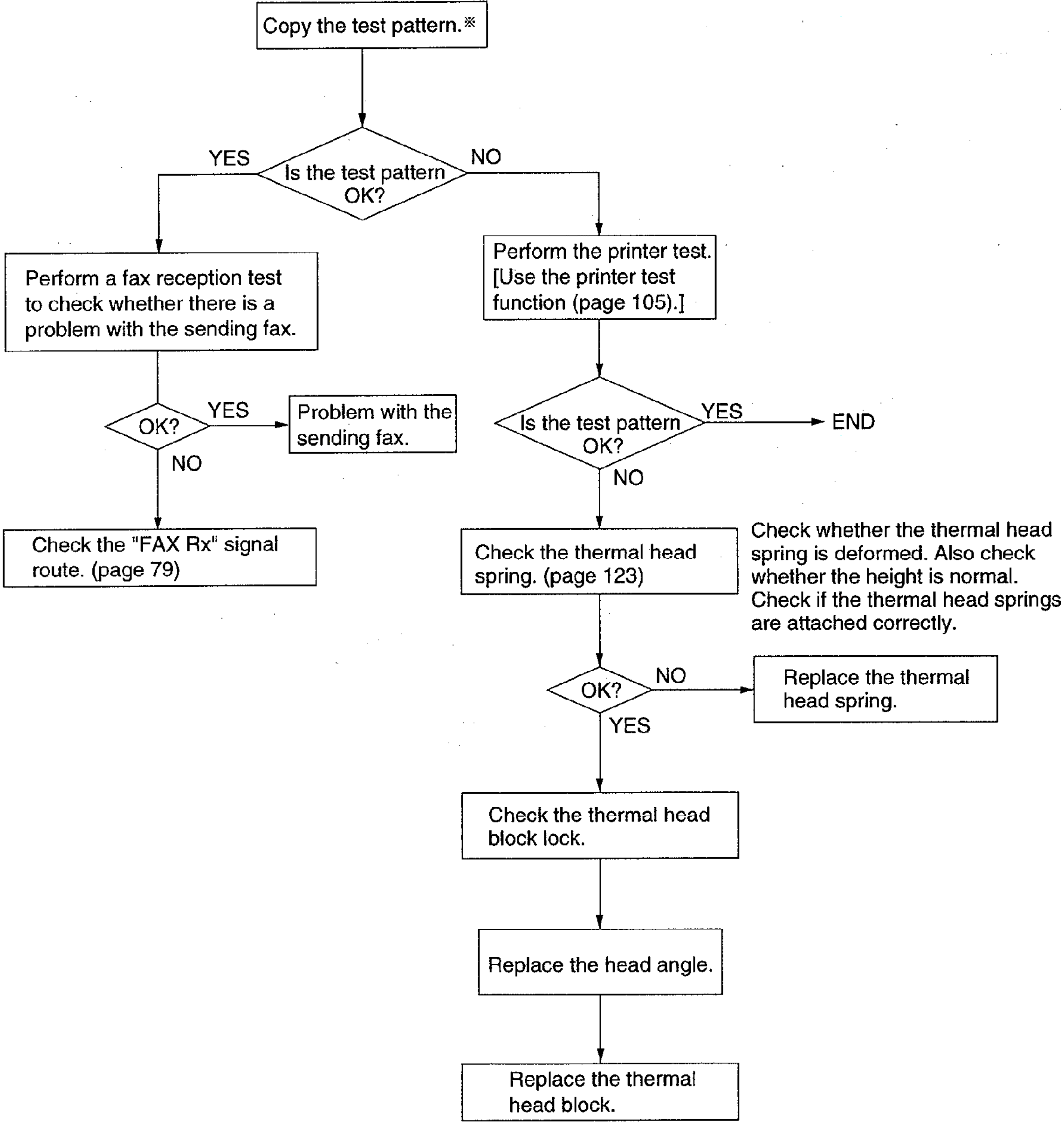
(14) Black or white lateral line on print out

※ **We recommend making a copy of the Fig. A document on page 34 and using it.**


Copy the test pattern.※
Is the test pattern OK?
YES
NO
A problem with the other FAX machine.
Check the recording paper feed section. [Use the motor test function (page 105).]
Rotation OK?
NO
YES
Check the gear for distortion.
OK?
NO
Replace the gear.
YES
Check the connector for the motor.
OK?
NO
Replace or fix the connector.
YES
Replace the motor.
OK?
YES
END
NO
Go to the digital board section. (page 66)
Check if the roller surface is deformed.
Check the document feed rollers and pickup roller. (pages 129 and 130)
OK?
NO
Replace the roller.
YES
B
(Page 39)

(15) An abnormal image is printed.

※ We recommend making a copy of the Fig. A document on page 34 and using it.


Copy the test pattern.※
Is the test pattern OK?
YES
NO
Perform a fax reception test to check whether there is a problem with the sending fax.
OK?
YES
Problem with the sending fax.
NO
Check the "FAX Rx" signal route. (page 79)
Perform the printer test. [Use the printer test function (page 105).]
Is the test pattern OK?
YES
END
NO
Check the thermal head spring. (page 123)
Check whether the thermal head spring is deformed. Also check whether the height is normal. Check if the thermal head springs are attached correctly.
OK?
NO
Replace the thermal head spring.
YES
Check the thermal head block lock.
Replace the head angle.
Replace the thermal head block.

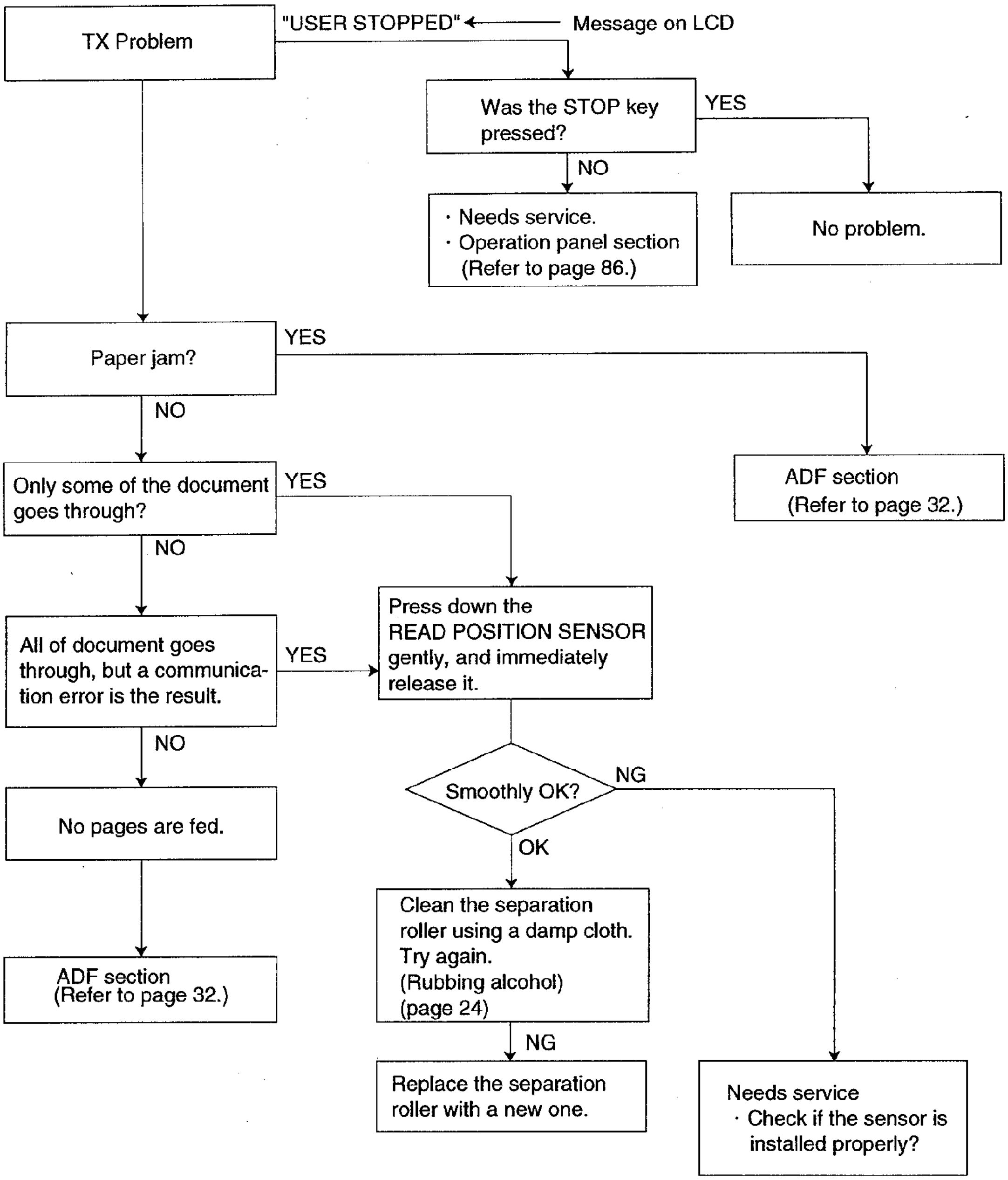
3.3.3 Communication Section

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in the reference pages (P45 - P61).

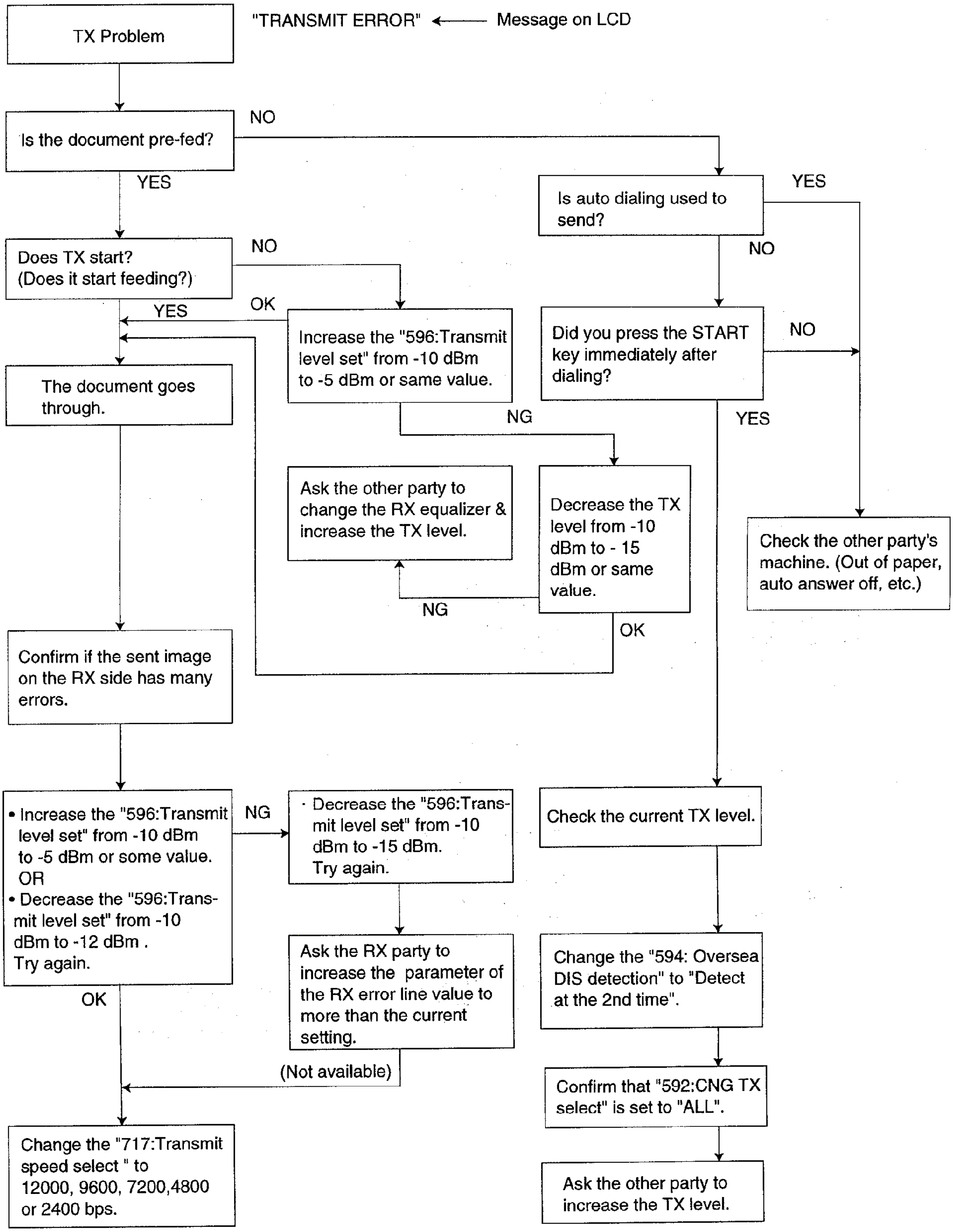
No.	Symptom	Ref. page	Content	Possible cause
1	The paper does not feed properly when faxing. (Copying is also not possible.)	p. 45	Troubleshooting	Problem with the feeding mechanism.
2	The fax transmits successfully one time and fails another. (Copying is also possible.)	p. 46	Troubleshooting	Problem with the service line or with the receiver's fax.
3	The fax receives successfully one time and fails another. (Copying is also possible.)	p. 47	Troubleshooting	Problem with the service line or with the transmitter's fax.
4	The fax completely fails to transmit or receive. (Copying is also possible.)	p. 49	Troubleshooting	Problem with the electric circuit.
5	The fax fails either to transmit or receive when making a long distance or international call. (Copying is also possible.)	p. 50 ~ p. 52	Detailed description of the possible causes (Similar to troubleshooting items No.2 and No.3.)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or international call.	p. 52		
7	No.1-No.5	p. 53 ~ p. 61	The troubleshooting procedure for each error code will be printed on the communication result report.	

1) Defective facsimile section

①Transmit problem


TX Problem
"USER STOPPED"
Message on LCD
Was the STOP key pressed?
YES
NO
· Needs service.
· Operation panel section (Refer to page 86.)
No problem.
Paper jam?
YES
NO
ADF section (Refer to page 32.)
Only some of the document goes through?
YES
NO
Press down the READ POSITION SENSOR gently, and immediately release it.
All of document goes through, but a communication error is the result.
YES
NO
Smoothly OK?
NG
OK
No pages are fed.
Clean the separation roller using a damp cloth. Try again. (Rubbing alcohol) (page 24)
NG
ADF section (Refer to page 32.)
Replace the separation roller with a new one.
Needs service
· Check if the sensor is installed properly?

②Sometimes there is a transmit problem.

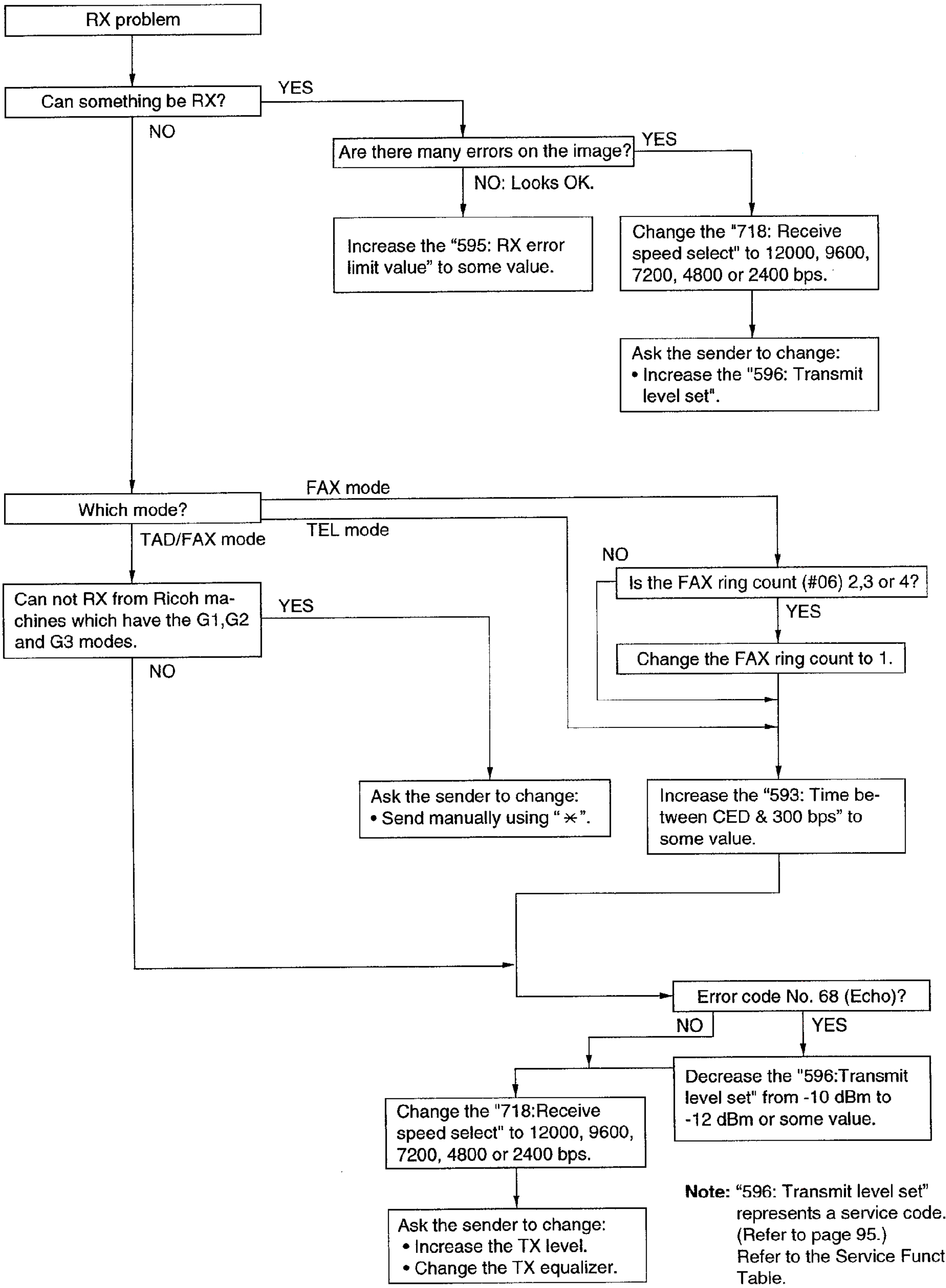

TX Problem
"TRANSMIT ERROR"
Message on LCD
Is the document pre-fed?
NO
YES
Does TX start? (Does it start feeding?)
NO
YES
OK
Increase the "596:Transmit level set" from -10 dBm to -5 dBm or same value.
NG
The document goes through.
Ask the other party to change the RX equalizer & increase the TX level.
Decrease the TX level from -10 dBm to - 15 dBm or same value.
NG
OK
Is auto dialing used to send?
YES
NO
Did you press the START key immediately after dialing?
NO
YES
Check the other party's machine. (Out of paper, auto answer off, etc.)
Confirm if the sent image on the RX side has many errors.
• Increase the "596:Transmit level set" from -10 dBm to -5 dBm or some value. OR • Decrease the "596:Transmit level set" from -10 dBm to -12 dBm . Try again.
NG
· Decrease the "596:Transmit level set" from -10 dBm to -15 dBm. Try again.
Ask the RX party to increase the parameter of the RX error line value to more than the current setting.
(Not available)
OK
Change the "717:Transmit speed select " to 12000, 9600, 7200,4800 or 2400 bps.
Check the current TX level.
Change the "594: Oversea DIS detection" to "Detect at the 2nd time".
Confirm that "592:CNG TX select" is set to "ALL".
Ask the other party to increase the TX level.

Note: "596: Transmit level set" represents
a service code. (Refer to page 95.)
Refer to the Service Function Table.

③Receive problem

Confirm the following before starting troubleshooting.

- Is the recording paper installed properly? Refer to the next page.


RX problem
Can something be RX?
YES
NO
Are there many errors on the image?
YES
NO: Looks OK.
Increase the "595: RX error limit value" to some value.
Change the "718: Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the "596: Transmit level set".
Which mode?
FAX mode
TEL mode
TAD/FAX mode
NO
Is the FAX ring count (#06) 2,3 or 4?
YES
Change the FAX ring count to 1.
Can not RX from Ricoh machines which have the G1,G2 and G3 modes.
YES
NO
Ask the sender to change:
• Send manually using "＊".
Increase the "593: Time between CED & 300 bps" to some value.
Error code No. 68 (Echo)?
NO
YES
Decrease the "596:Transmit level set" from -10 dBm to -12 dBm or some value.
Change the "718:Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the TX level.
• Change the TX equalizer.

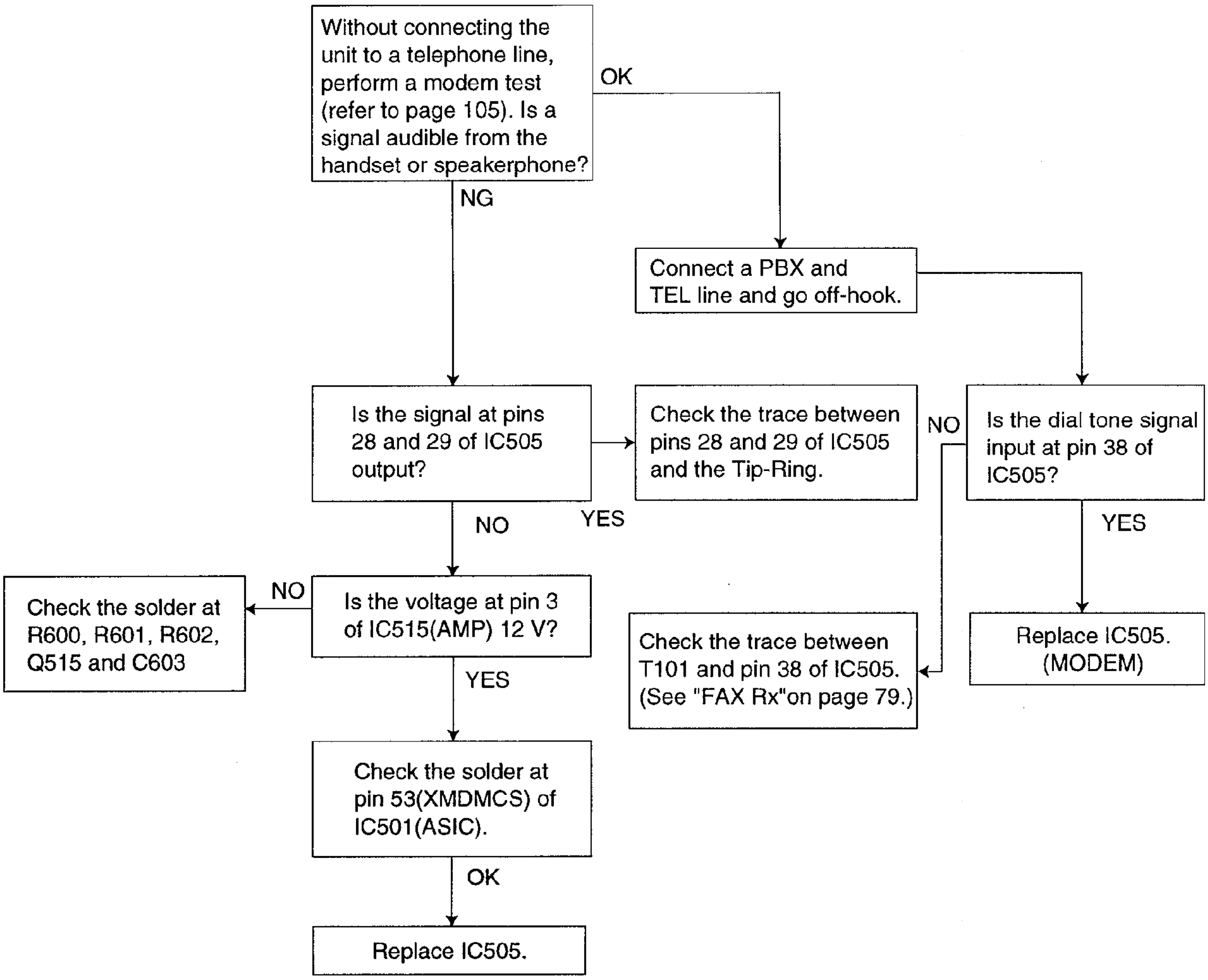
Note: "596: Transmit level set" represents a service code. (Refer to page 95.)
Refer to the Service Function Table.

For the receiving problem, we have thought of causes other than in the software. Some causes may be when the fax changes to the memory receiving mode (for example, when out of paper), and the memory becomes full of the unprinted fax data. In this case, [MEMORY FULL] and its main cause (for example, "CHECK PAPER") are displayed on the LCD. Accordingly, by solving the main problem, [MEMORY FULL] can be canceled and the receiving problem can be resolved. The causes of the display errors are shown below.

CHECK PAPER
CHECK COVER
FILM EMPTY
UNIT OVERHEATED (COVER OPEN, etc., it is necessary to reset the unit.)
PAPER JAMMED
CHECK FILM

Please refer to "2. User Recoverable Errors" (refer to page 27) for the above items.
Also, when it actually becomes a hardware deformity, please check each sensor. (Refer to page 106.)

④The unit can copy, but cannot transmit/receive.

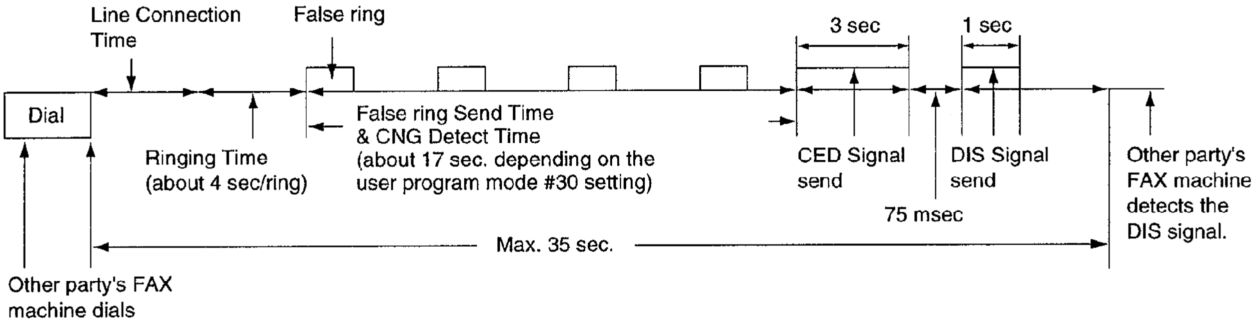

Without connecting the unit to a telephone line, perform a modem test (refer to page 105). Is a signal audible from the handset or speakerphone?
OK
NG
Connect a PBX and TEL line and go off-hook.
Is the signal at pins 28 and 29 of IC505 output?
YES
NO
Check the trace between pins 28 and 29 of IC505 and the Tip-Ring.
Is the dial tone signal input at pin 38 of IC505?
NO
YES
Check the solder at R600, R601, R602, Q515 and C603
NO
Is the voltage at pin 3 of IC515(AMP) 12 V?
YES
Check the trace between T101 and pin 38 of IC505. (See "FAX Rx"on page 79.)
Replace IC505. (MODEM)
Check the solder at pin 53(XMDMCS) of IC501(ASIC).
OK
Replace IC505.

⑤ The unit can copy, but cannot either transmit/receive long distance or international communications.

The following 2 causes can be considered for this.

Cause 1:
The other party is executing automatic dialing, the call has been received by this unit, and the CED or DIS signal response time is too long. (In most cases, this unit detects the CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication procedure is stopped when there is no response from the other party within 35 sec, so that the other party releases the line.)

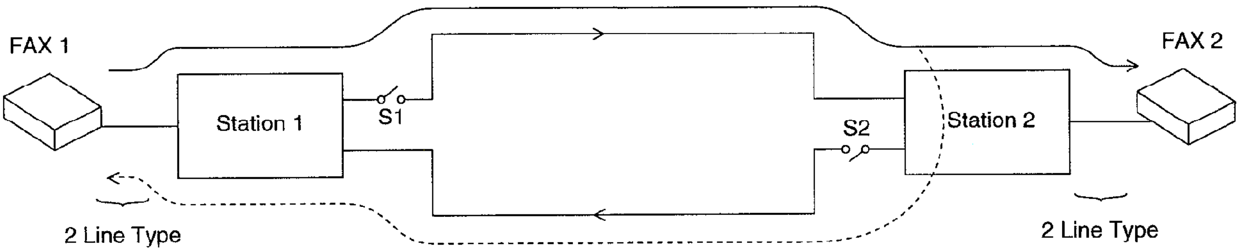
(Response Time)


Line Connection Time
False ring
3 sec
1 sec
Dial
False ring Send Time & CNG Detect Time (about 17 sec. depending on the user program mode #30 setting)
Ringing Time (about 4 sec/ring)
CED Signal send
DIS Signal send
75 msec
Other party's FAX machine detects the DIS signal.
Max. 35 sec.
Other party's FAX machine dials

(Cause and Countermeasure)
As shown in the chart above, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time cannot be reduced. Accordingly, the following countermeasures should be tried.

(A) As the 35 sec. count is started directly after dialing or directly after the START button has been pressed for models with a START button, the other party should be called manually, if possible.
Another possibility is entering two pauses at the end of the auto dial number on the transmission side. Then the count start time can be delayed for 2 pauses (about 10 sec.).

Cause 2:
Erroneous detection because of an echo or an echo canceler.


FAX 1
Station 1
S1
S2
Station 2
FAX 2
2 Line Type
2 Line Type

The sea bottom cable or satellite communication path (4 Line Type)

(Echo/Echo Canceler)
The signal from FAX1 reaches FAX2 via stations 1 and 2, but the reflection signal at station 2 also returns via station 1 (echo). As the distance between station 1 and station 2 is far, the echo returns to FAX 1 at a max of 600 msec after transmission. There is a possibility that this signal is detected erroneously as the signal from FAX2. For a normal call, there is also a possibility that the echo of their own voice will make the call difficult to understand. For this reason, each station (station 1 and station 2) attaches echo cancelers (S1 and S2) for international lines or long distance lines. For the echo canceler, the level of the transmission signal from FAX 1 is compared with the level of the reception signal from FAX2. When the transmission signal is larger, S1 is closed while S2 is opened when it is smaller. In other words, for transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Causes and Countermeasures)

(Cause A)

When a training signal is transmitted from FAX1 during the communication procedure at the time of transmission from FAX1 to FAX2, there is a delay until the echo canceler operates. S1 is closed so that a part of the head of the training signal may drop out. Normal reception by FAX2 may not be possible, and transmission may not be started.

(Countermeasure A)

When the international line mode is ON in the service mode (code No. 521), a dummy signal is attached to the head of the training signal to prevent this problem. As this normally is ON, it is necessary to reconfirm that this has not become OFF. When the international mode is switched OFF, the transmission side will try the training signal three times at each speed (9600BPS, 4800BPS and 2400BPS). If NG, it will drop the speed by one rank (fall-back). When the international mode is switched ON, each speed will be tried only twice. In other words, the slower speed with fewer errors can be accessed more easily. This is done because the line conditions may deteriorate and the picture may be disturbed more easily during communication for international lines or long distance communication, even when the training is OK. The default value is ON as preference is given to clearer pictures rather than speed.

(Cause B)

The echo canceler operation is stopped with a 2100Hz signal. (i.e. S1 and S2 become ON).

Accordingly, when FAX1 has executed automatic reception, a CED signal is output. If this signal is 2100Hz, S1 and S2 will become ON. Then the echo of the DIS signal output afterwards may be received and FAX1 may execute an erroneous operation, preventing communication from starting.

(Countermeasure B)

In the service mode, the CED signal frequency is set to 1100 Hz (code No.520), or the time setting between the CED signal and the DIS signal is set from 75 msec to 500 msec in the service mode (code No.593). This is because the echo canceler operation stop mode is canceled by an interval of 250 msec or more.

(Cause C)

This model is FAX1 and the other party is FAX2.

For transmission from this model to FAX2, FAX2 executes automatic reception and transmits a CED signal (2100 Hz) followed by a DIS signal. As the echo cancelers stops as described in cause B, the echo of the DIS signal returns to FAX2. On the other hand, this model detects the DIS signal and transmits a DCS signal. In other words, it is possible that the echo of the DIS signal and the DCS signal transmitted from this model reach FAX2 one after the other. FAX2 defect an error and communication is not started.

(Countermeasure C)

When the international DIS detection setting is set in the service mode (code No.594), this model does not respond to the first DIS signal and returns a DCS signal only for the second DIS signal.

In other words, there is an interval of 250 msec between transmission of the first and second DIS signal so that the echo cancelers operation recovers. An echo is not generated for the second DIS signal.

Note:

When the other FAX does not respond with a DCS signal after DIS signal transmission, the DIS signal is transmitted three times for trial.

KX-FP270

Summary:
Long distance and international communication operations

SYMPTOM	COUNTERMEASURE
Does not receive in the automatic mode.	1. If possible, manual transmission should be done from the transmission side. 2. If possible, two pauses should be inserted at the end of the auto dial number on the transmission side. 3. If possible, the Function Selector Switch should be switched to FAX.
Does not transmit.	1. Confirm the international line mode is ON. (Service mode: code No. 521) 2. Enable the international DIS detection setting. (Service mode: code No. 594)
Does not receive.	1. Set the time setting between the CED signal and the DIS signal to 500 msec. (Service mode: code No. 593) 2. Set the CED frequency to 1100Hz. (Service mode: code No. 520)

⑥The unit can copy, but the transmission and reception image are incorrect. (Long distance or international communication operation)

This widely depends on the transmission and reception capability of the other FAX unit and the line conditions.
The countermeasures for this unit are shown below.

Transmission Operation:
Set the transmitting speed to 4800BPS (service mode: code No. 717) or select the overseas mode.

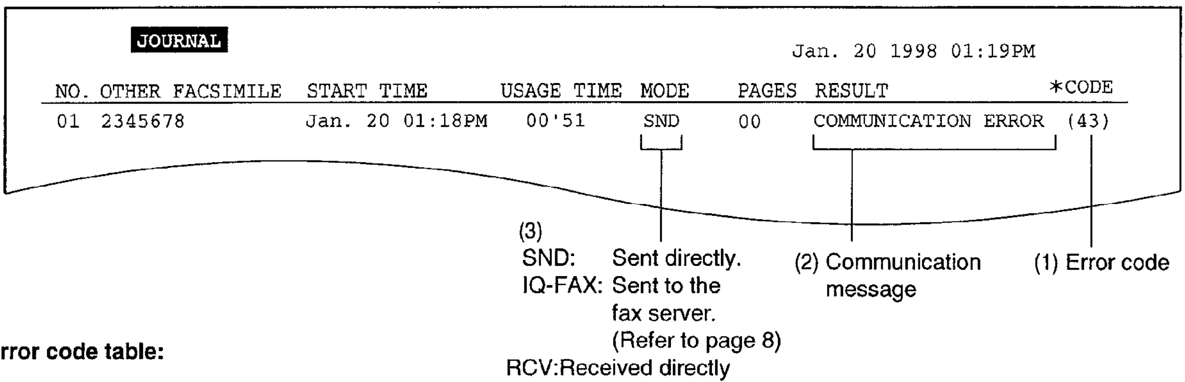
Reception Operation:
If 80% or more of the reception is incorrect, set the receiving speed to 4800BPS. (Service mode: code No. 718)

- Refer to page 92 for the service mode's code setting.

⑦ How to output the Journal Report:

1. Press the MENU button.
2. Press "#", then " 2 " and " 2 ".
3. Press the START/COPY/SET button.
4. Press ▼ or ▲ to select the desired setting.
5. Press the START/COPY/SET button.
6. The report prints out.

Sample of a journal report



```
       JOURNAL
                                                              Jan. 20 1998 01:19PM

  NO. OTHER FACSIMILE  START TIME       USAGE TIME  MODE     PAGES  RESULT                  *CODE
  01  2345678          Jan. 20 01:18PM   00'51       SND      00     COMMUNICATION ERROR  (43)
```

(3)
SND: Sent directly.
IQ-FAX: Sent to the fax server. (Refer to page 8)
RCV:Received directly
(2) Communication message
(1) Error code

Error code table:

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Counter-measure (go to the next page)
	PRESSED THE STOP KEY	TX & RX	Communication was interrupted by the STOP button.	
	DOCUMENT JAMMED	TX	The document paper is jammed.	
	NO DOCUMENT	TX	No document paper.	
	THE COVER WAS OPENED	TX & RX	The cover is open.	
40	NO RESPONSE	TX	Transmission is finished when the T1 TIMER expires.	1
41	COMMUNICATION ERROR	TX	DCN is received after DCS transmission.	2
42	COMMUNICATION ERROR	TX	FTT is received after transmission of a 2400BSP training signal.	3
43	COMMUNICATION ERROR	TX	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	TX	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RX	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RX	No post message.	7
49	COMMUNICATION ERROR	RX	RTN is transmitted.	8
50	COMMUNICATION ERROR	RX	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RX	PIN is transmitted.	8
52	NO RESPONSE	RX	Reception is finished when the T1 TIMER expires.	9
54	ERROR–NOT YOUR UNIT	RX	DCN is received after DIS transmission.	11
58	COMMUNICATION ERROR	RX	DCN is received after FTT transmission.	13
59	ERROR–NOT YOUR UNIT	TX	DCN responds to the post message.	14
65	COMMUNICATION ERROR	TX	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RX	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	2
68	COMMUNICATION ERROR	RX	No response at the other party after MCF or CFR is transmitted.	13
70	ERROR–NOT YOUR UNIT	RX	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RX	Carrier is cut when the image signal is received.	16
75	MEMORY FULL	RX	The document was not received due to memory full.	
79	CANCELED	TX	The multistation transmission was rejected by the user.	
FF	COMMUNICATION ERROR	TX & RX	Modem error. For the DCN, DCN, etc. abbreviations, refer to "5. Modem Section" on page 162.	12

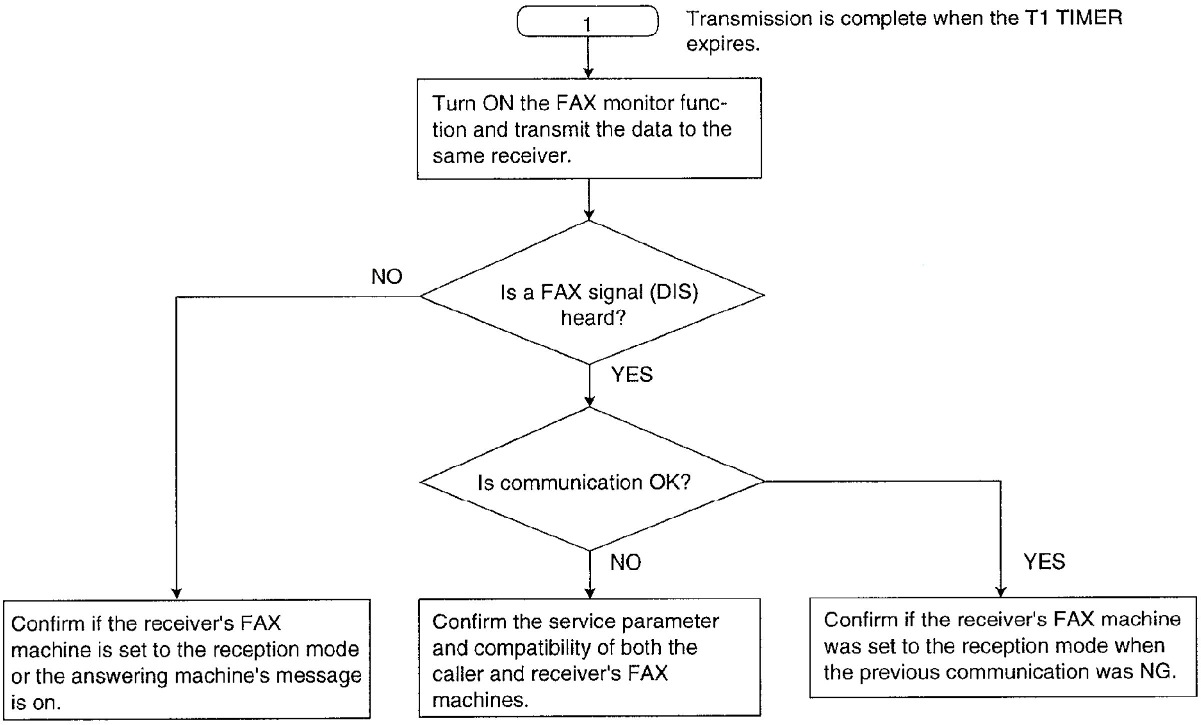
TX=TRANSMISSION RX=RECEPTION

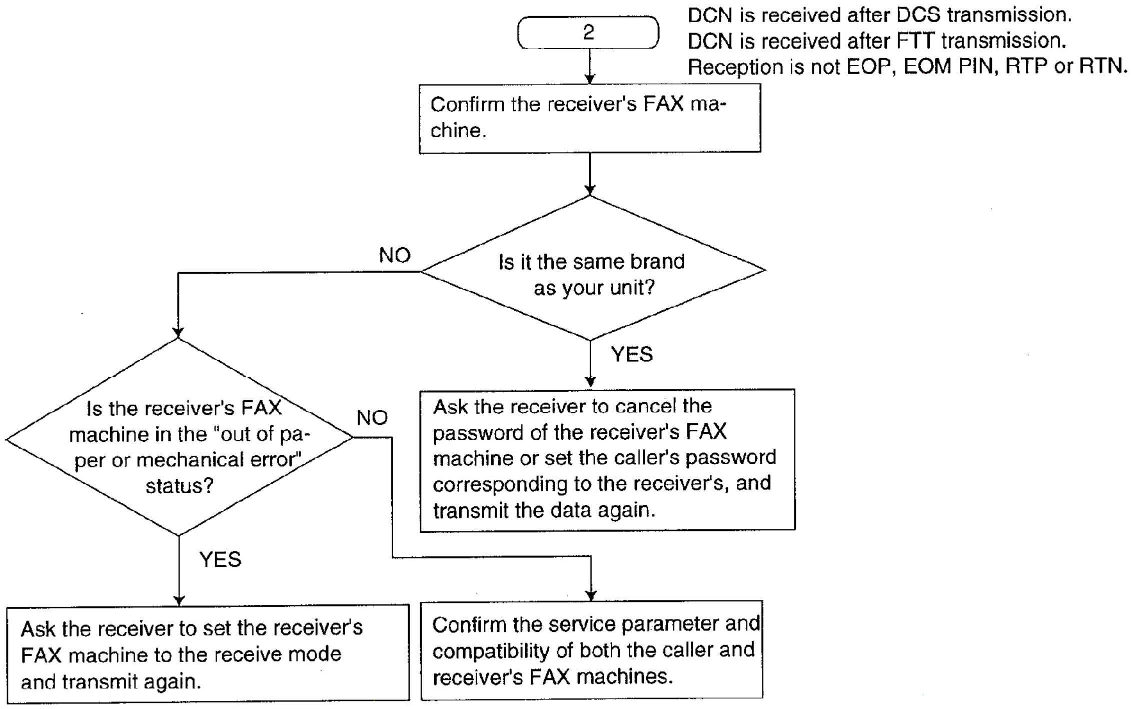
※Most fax communication problems can be resolved by the following steps.

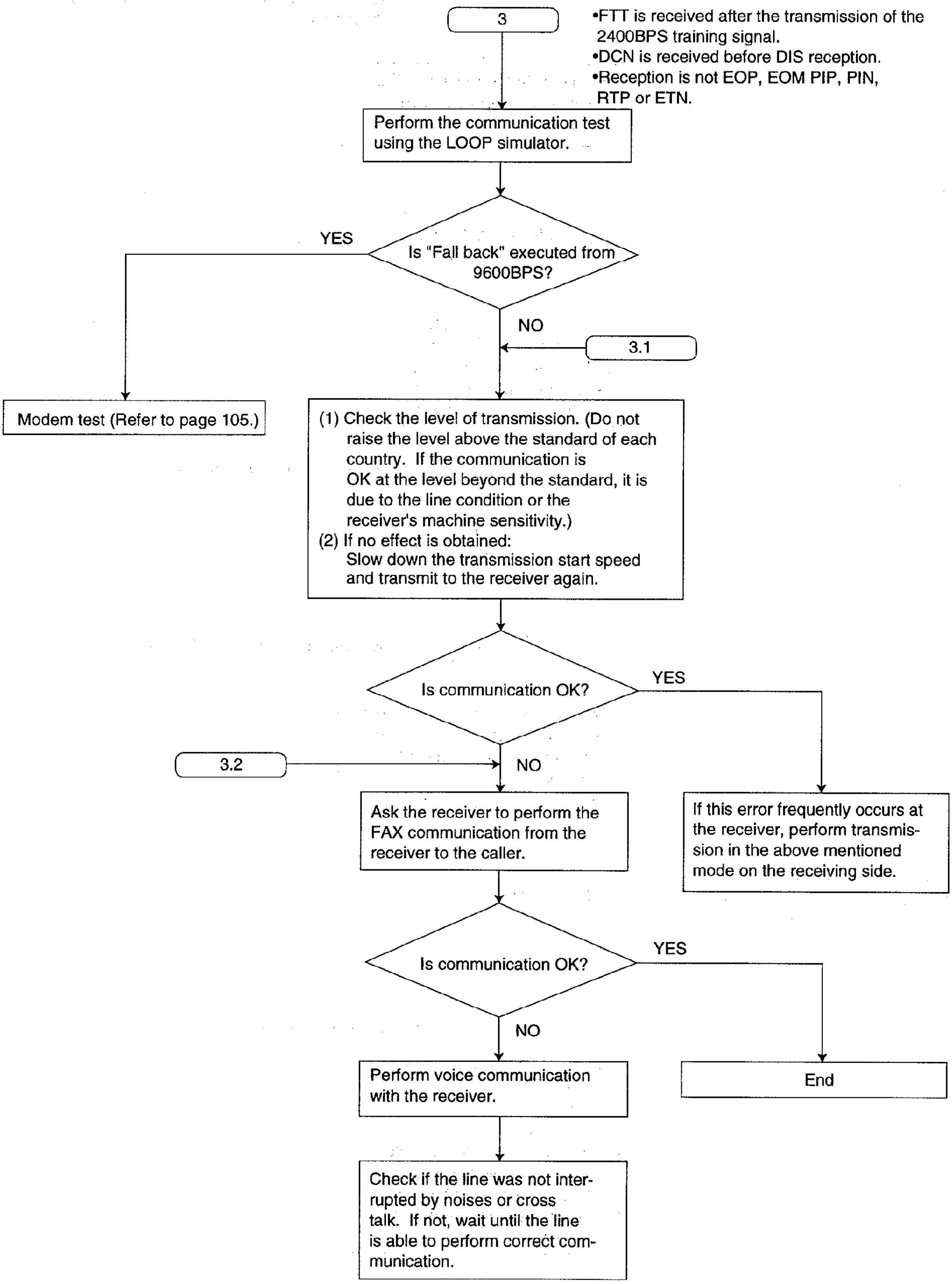
1) Change the transmit level. (Service code: 596, refer to page 95.)
2) Change the TX speed/RX speed. (Service code: 717/718, refer to page 95.)

If the problem remains , see the next page.

Countermeasure


1
Transmission is complete when the T1 TIMER expires.
Turn ON the FAX monitor function and transmit the data to the same receiver.
Is a FAX signal (DIS) heard?
NO
YES
Is communication OK?
NO
YES
Confirm if the receiver's FAX machine is set to the reception mode or the answering machine's message is on.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.
Confirm if the receiver's FAX machine was set to the reception mode when the previous communication was NG.


2
DCN is received after DCS transmission.
DCN is received after FTT transmission.
Reception is not EOP, EOM PIN, RTP or RTN.
Confirm the receiver's FAX machine.
Is it the same brand as your unit?
NO
YES
Is the receiver's FAX machine in the "out of paper or mechanical error" status?
NO
YES
Ask the receiver to cancel the password of the receiver's FAX machine or set the caller's password corresponding to the receiver's, and transmit the data again.
Ask the receiver to set the receiver's FAX machine to the receive mode and transmit again.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.



- FTT is received after the transmission of the 2400BPS training signal.
- DCN is received before DIS reception.
- Reception is not EOP, EOM PIP, PIN, RTP or ETN.

Perform the communication test using the LOOP simulator.

Is "Fall back" executed from 9600BPS?

Modem test (Refer to page 105.)

(1) Check the level of transmission. (Do not raise the level above the standard of each country. If the communication is OK at the level beyond the standard, it is due to the line condition or the receiver's machine sensitivity.)

(2) If no effect is obtained: Slow down the transmission start speed and transmit to the receiver again.

Is communication OK?

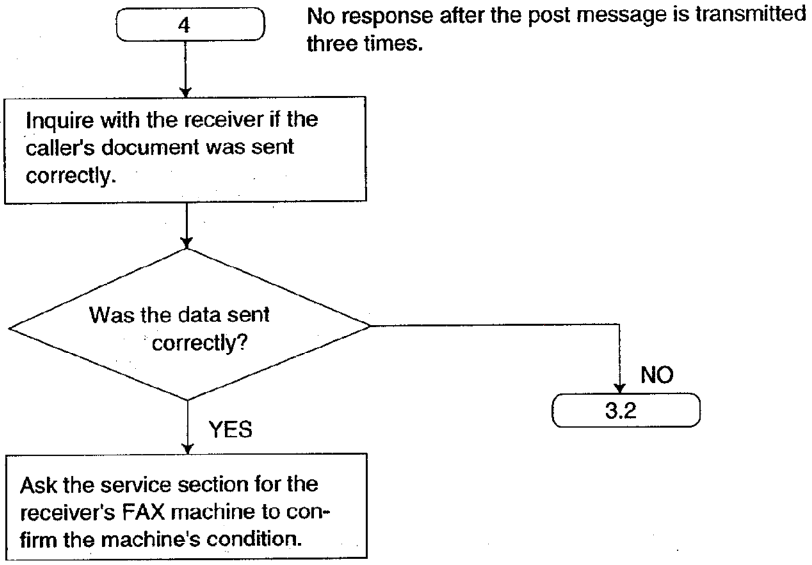
Ask the receiver to perform the FAX communication from the receiver to the caller.

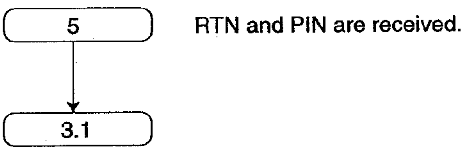
If this error frequently occurs at the receiver, perform transmission in the above mentioned mode on the receiving side.

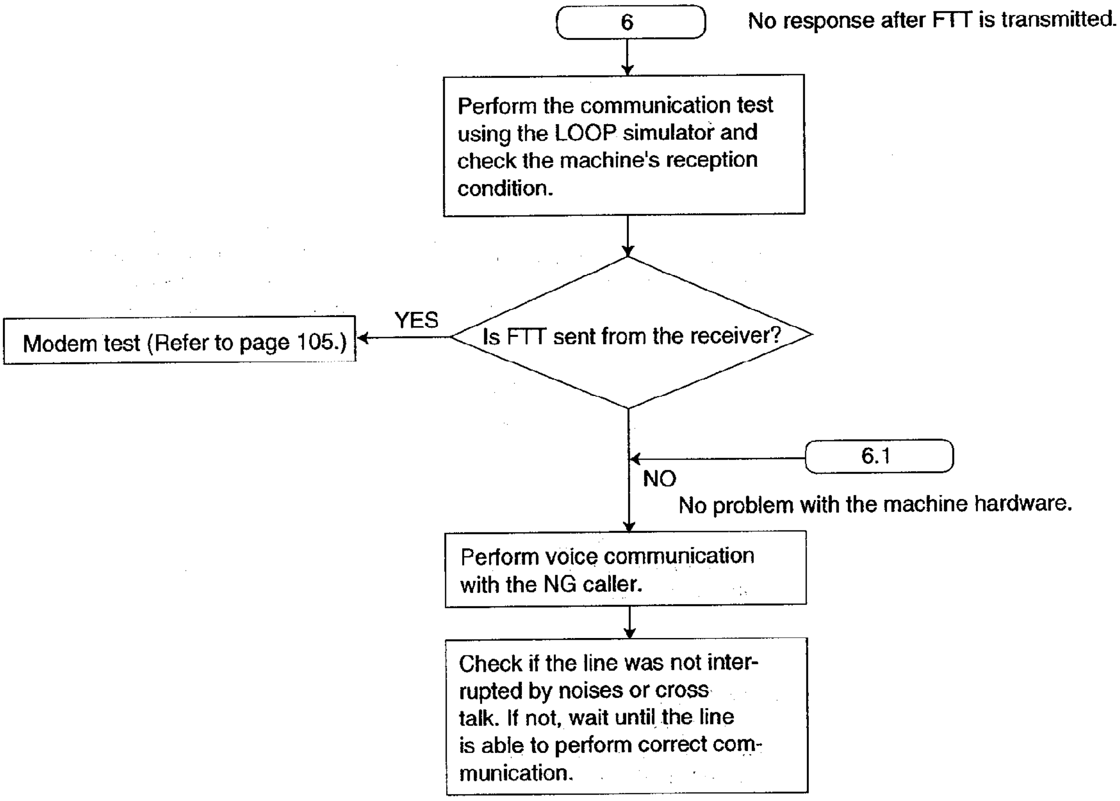
Is communication OK?

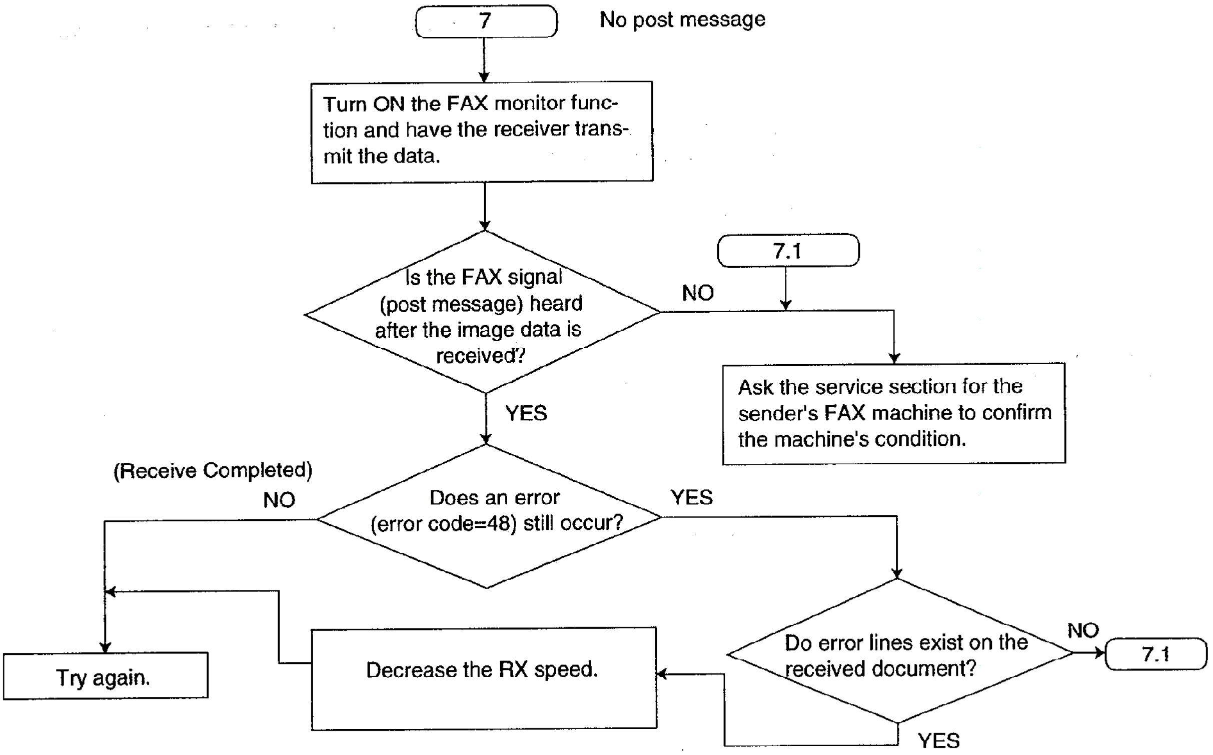
Perform voice communication with the receiver.

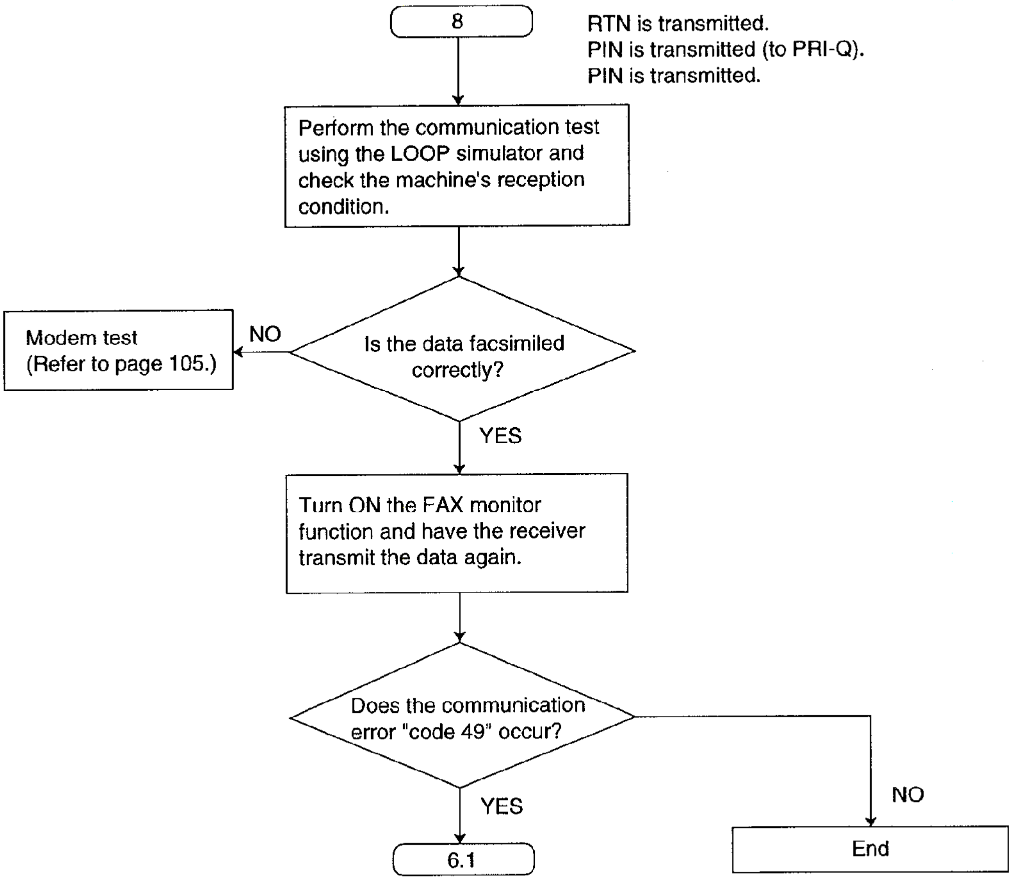
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

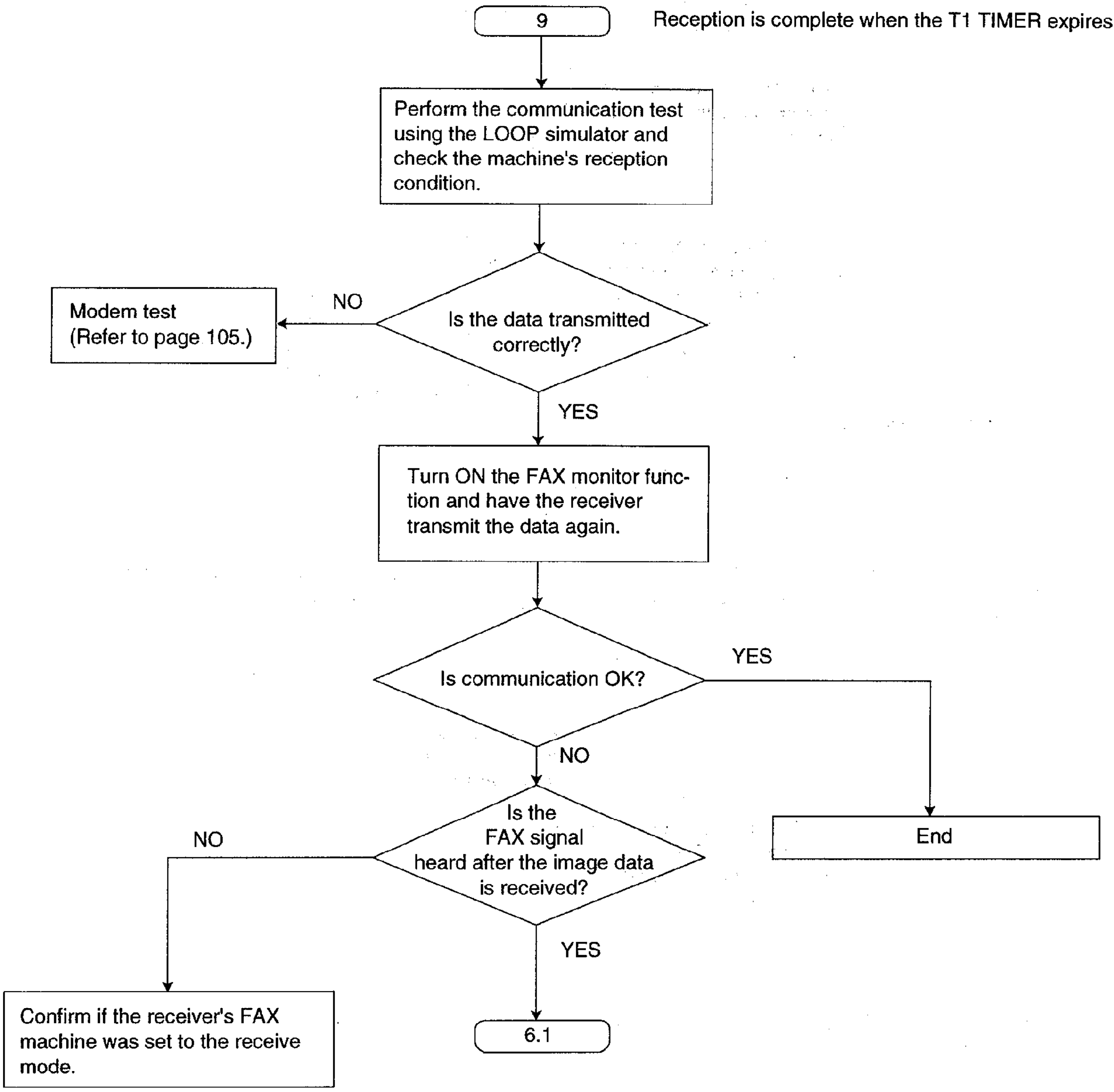

4
No response after the post message is transmitted three times.
Inquire with the receiver if the caller's document was sent correctly.
Was the data sent correctly?
NO
3.2
YES
Ask the service section for the receiver's FAX machine to confirm the machine's condition.


5
RTN and PIN are received.
3.1


6
No response after FTT is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is FTT sent from the receiver?
YES
Modem test (Refer to page 105.)
6.1
NO
No problem with the machine hardware.
Perform voice communication with the NG caller.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

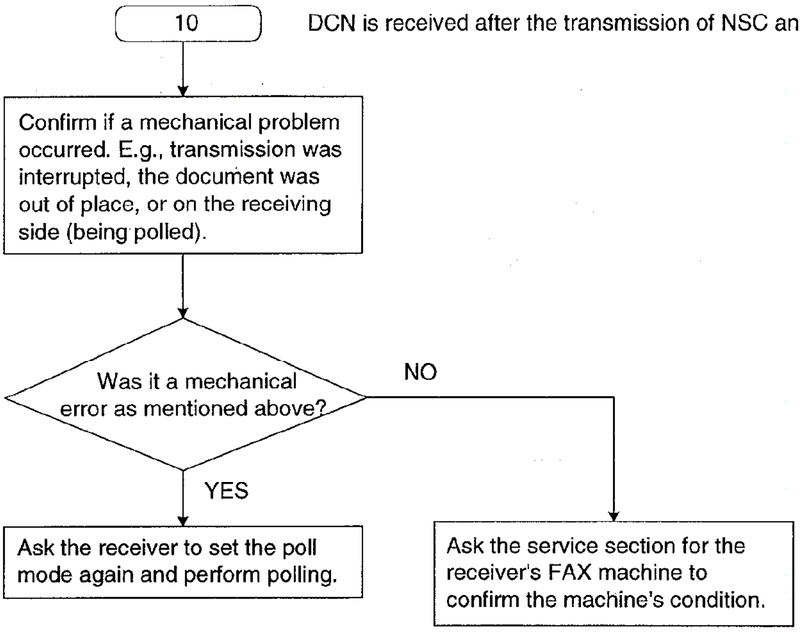

7
No post message
Turn ON the FAX monitor function and have the receiver transmit the data.
Is the FAX signal (post message) heard after the image data is received?
NO
7.1
Ask the service section for the sender's FAX machine to confirm the machine's condition.
YES
(Receive Completed)
NO
Does an error (error code=48) still occur?
YES
Try again.
Decrease the RX speed.
Do error lines exist on the received document?
NO
7.1
YES


8
RTN is transmitted.
PIN is transmitted (to PRI-Q).
PIN is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test (Refer to page 105.)
NO
Is the data facsimiled correctly?
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Does the communication error "code 49" occur?
YES
NO
6.1
End

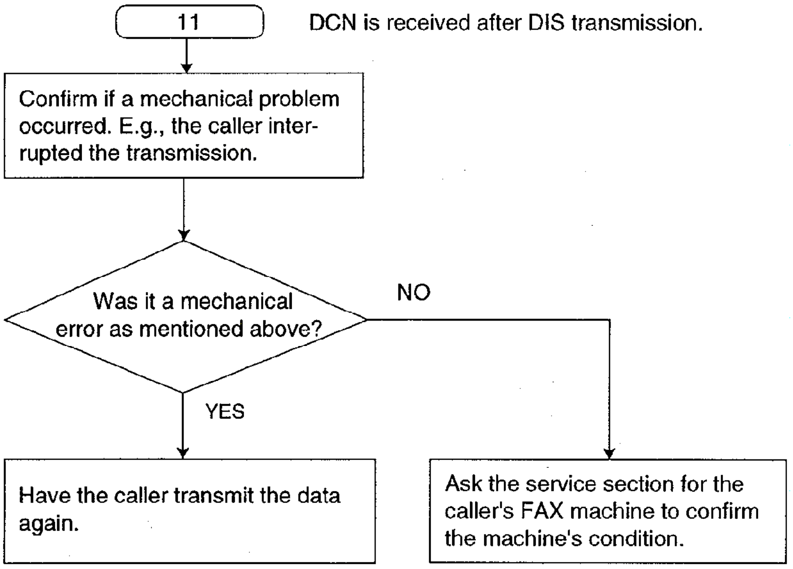


Reception is complete when the T1 TIMER expires.

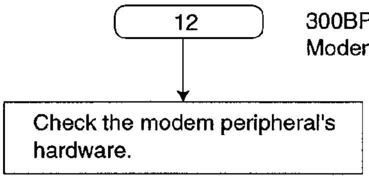
9
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is the data transmitted correctly?
NO
Modem test (Refer to page 105.)
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Is communication OK?
YES
End
NO
Is the FAX signal heard after the image data is received?
NO
Confirm if the receiver's FAX machine was set to the receive mode.
YES
6.1


DCN is received after the transmission of NSC and DTC.

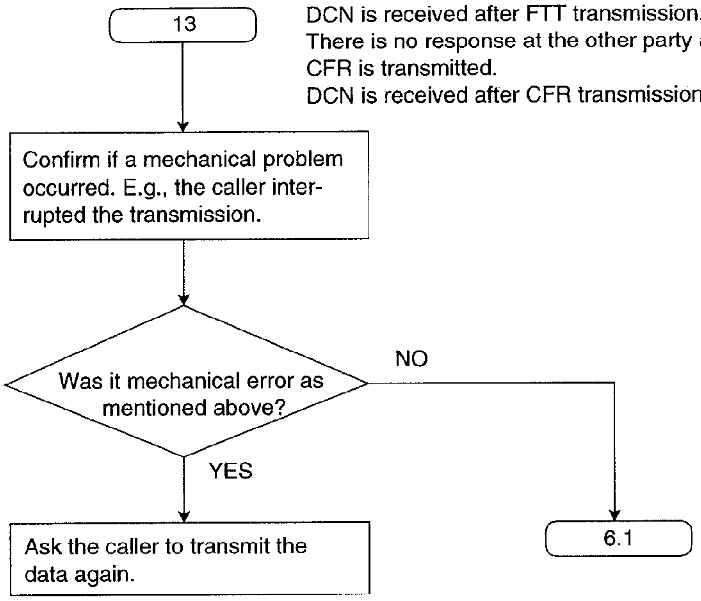
10
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.


DCN is received after DIS transmission.

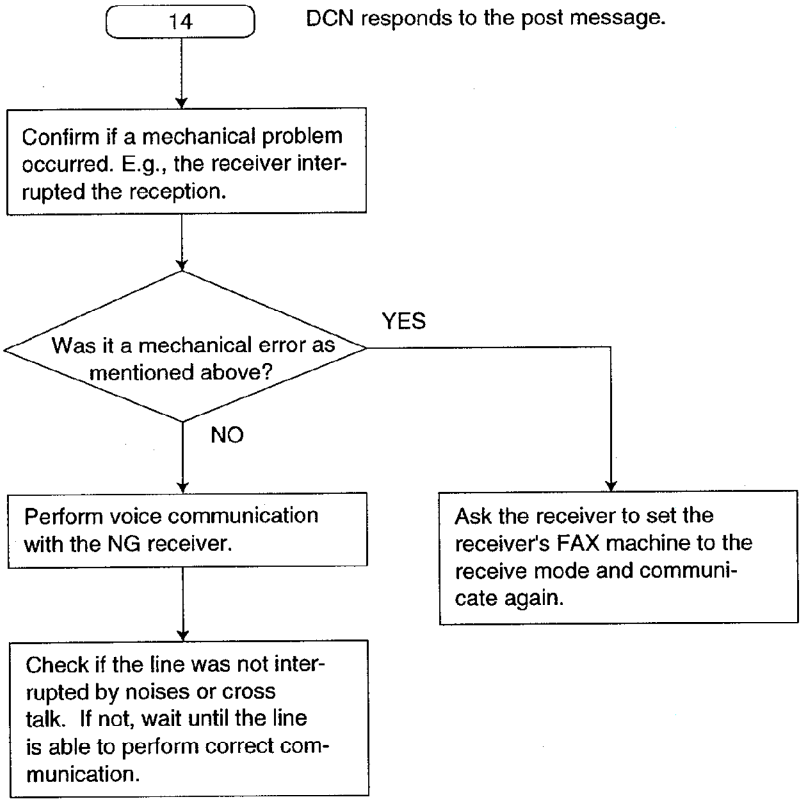
11
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Have the caller transmit the data again.
Ask the service section for the caller's FAX machine to confirm the machine's condition.


300BPS error
Modem error

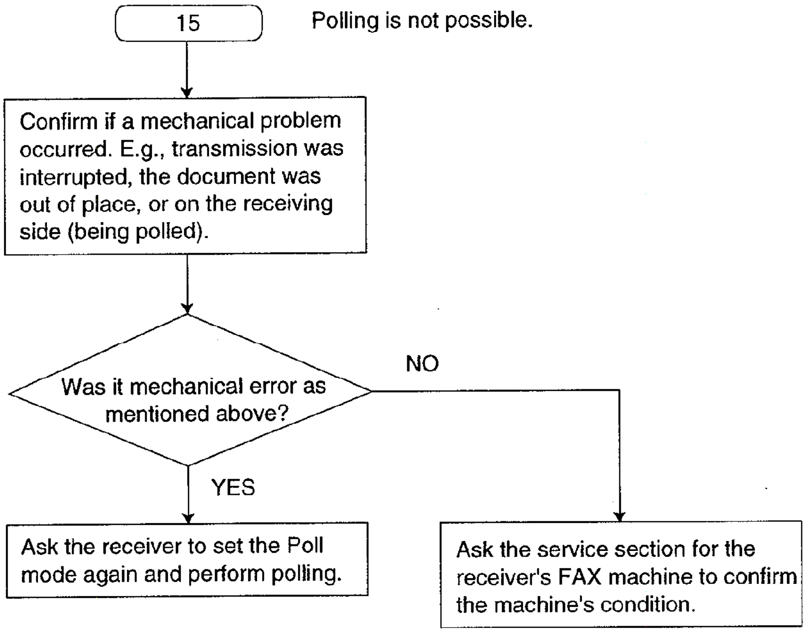
12
Check the modem peripheral's hardware.

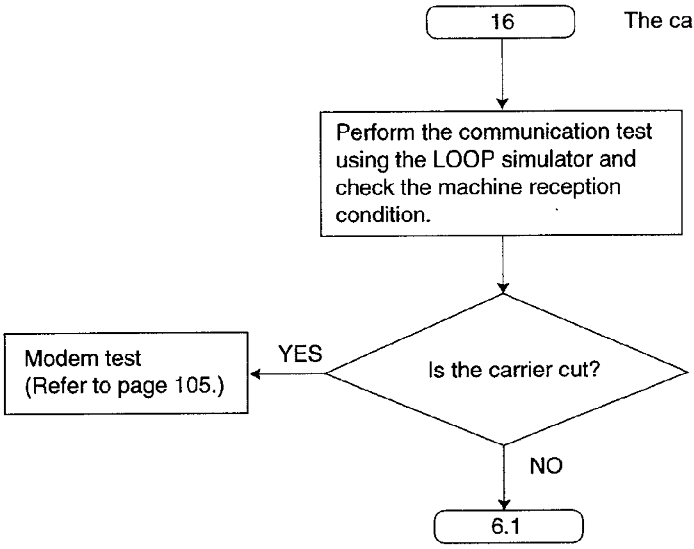

13
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it mechanical error as mentioned above?
NO
YES
Ask the caller to transmit the data again.
6.1

DCN is received after FTT transmission.
There is no response at the other party after MCF or CFR is transmitted.
DCN is received after CFR transmission.


14
Confirm if a mechanical problem occurred. E.g., the receiver interrupted the reception.
Was it a mechanical error as mentioned above?
YES
NO
Perform voice communication with the NG receiver.
Ask the receiver to set the receiver's FAX machine to the receive mode and communicate again.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

DCN responds to the post message.


Polling is not possible.
15
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it mechanical error as mentioned above?
NO
YES
Ask the receiver to set the Poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.


The carrier is cut when the image signal is received.
16
Perform the communication test using the LOOP simulator and check the machine reception condition.
Is the carrier cut?
YES
Modem test (Refer to page 105.)
NO
6.1

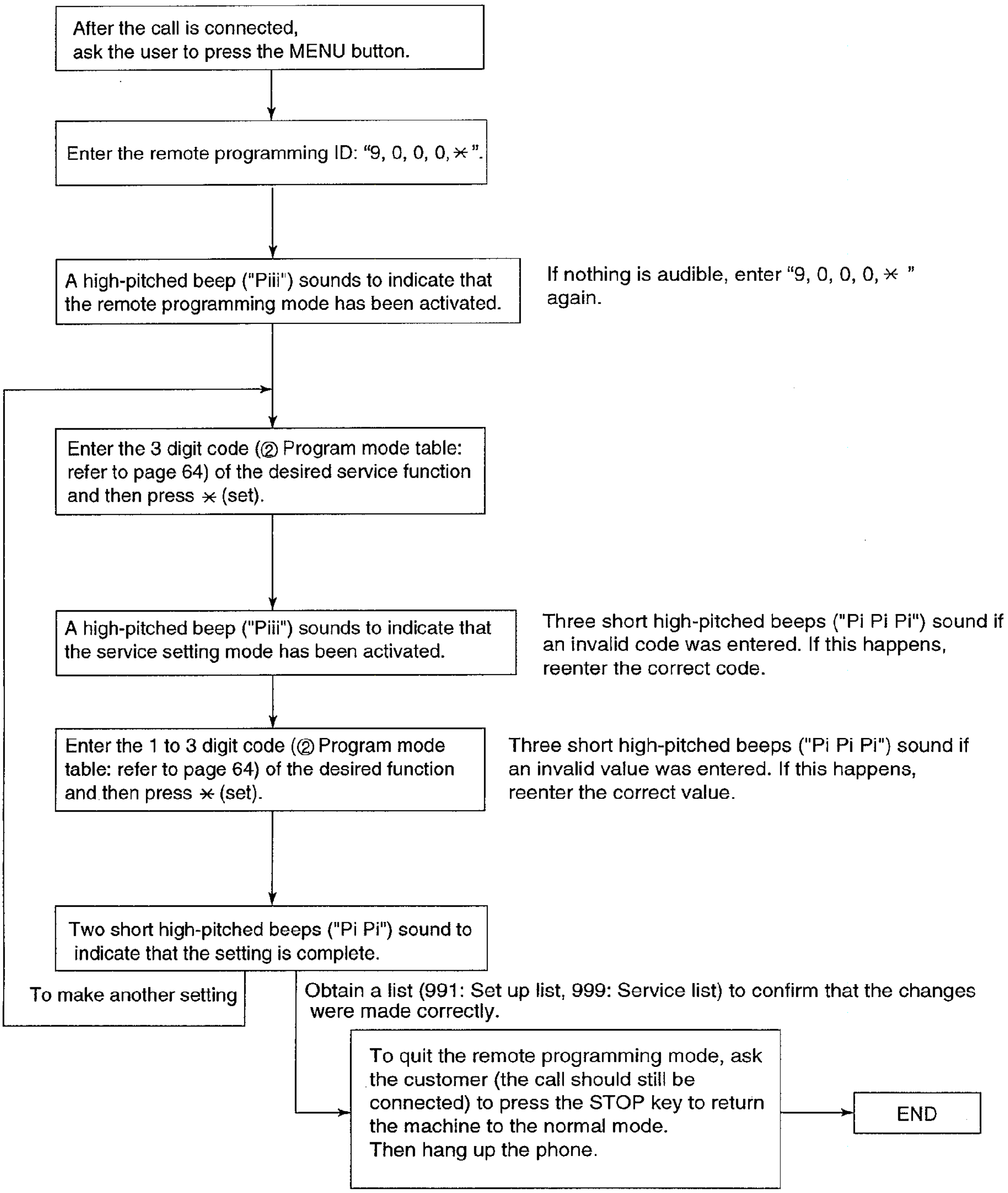
2) Remote programming

If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (② Program mode table: refer to page 64). The function used to accomplish this is remote programming.

First, in order to check the current status of the service code parameter, out put the setup list (code: 991) and service list (code: 999) from the customer's fax machine.
Based on this, the parameters for the desired codes can be changed.
The procedure for changing and listing parameters is described on the next page. Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that only the desired parameters were changed.

Hint:
Since the connected telephone is in use during the remote programming mode, it may be helpful to ask the customer to switch to the speakerphone. This frees the customer from the need to remain right next to the fax while you are making parameter settings. When finished, inform the customer. Also note that in very noisy locations where the DTMF tones are not audible, the remote programming function will not work.

① Entering the remote programming mode and changing service codes



After the call is connected, ask the user to press the MENU button.

Enter the remote programming ID: "9, 0, 0, 0, ⁎".

A high-pitched beep ("Piii") sounds to indicate that the remote programming mode has been activated.

If nothing is audible, enter "9, 0, 0, 0, ⁎ " again.

Enter the 3 digit code (② Program mode table: refer to page 64) of the desired service function and then press ⁎ (set).

A high-pitched beep ("Piii") sounds to indicate that the service setting mode has been activated.

Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid code was entered. If this happens, reenter the correct code.

Enter the 1 to 3 digit code (② Program mode table: refer to page 64) of the desired function and then press ⁎ (set).

Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid value was entered. If this happens, reenter the correct value.

Two short high-pitched beeps ("Pi Pi") sound to indicate that the setting is complete.

To make another setting

Obtain a list (991: Set up list, 999: Service list) to confirm that the changes were made correctly.

To quit the remote programming mode, ask the customer (the call should still be connected) to press the STOP key to return the machine to the normal mode. Then hang up the phone.

END

② Program Mode Table

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	mm/dd/yy hh:mm	Jan/01/98	NG
002	Your logo	---------	None	NG
003	Your telephone number	---------	None	NG
004	Transmission report mode	1:Error / 2:ON / 3:OFF	Error	OK
006	FAX ring count	1~4	2	OK
	TAD/FAX ring count	1~4/TOLL SAVER/RINGER OFF	2	OK
	Not available in TEL/FAX mode	---------	---------	OK
010	Recording time	1:VOX/2:MIN	VOX	OK
011	Remote ANS ID	---------	ID=111	NG
013	Dialing mode	1:Pulse / 2:Tone / 3:Auto	Auto	OK
015	Memory XMT	1:ON / 2:OFF	OFF	OK
022	Auto journal print	1:ON / 2:OFF	ON	OK
023	Overseas mode	ON / OFF	OFF	NG
025	Delayed transmission	ON / OFF	OFF	NG
026	Auto caller list	1:ON / 2:OFF	ON	OK
030	Silent FAX recognition ring	3 to 6 rings	3	OK
031	Distinctive ring	1:OFF / 2:A / 3:B / 4:C / 5:D	OFF	OK
036	Rx reduction	1:92% / 2:86% / 3:72% / 4:OFF	92%	OK
039	LCD contrast	1:Normal / 2:Darker	Normal	OK
040	Silent detection	1:ON / 2:OFF	ON	OK
041	Remote FAX activation code	ON / OFF	ON ID=✻9	NG
042	Message alert	1:ON / 2:OFF	OFF	OK
043	REC. time alert	1:ON / 2:OFF	OFF	OK
044	Receive alert	1:ON / 2:OFF	ON	OK
046	Friendly receive	1:ON / 2:OFF	ON	OK
047	FAX voice guidance	1:ERROR/2:ON/3:OFF	ON	OK
054	Common greeting MSG. REC. time	1:16s/2:60s	16s	OK
060	Message transfer	MESSAGE/PAGER/OFF	OFF	NG
061	Transfer greeting	CHECK/RECORD ERASE	CHECK	NG
067	ICM monitor	1:ON / 2:OFF	ON	OK
070	FAX Pager	ON / OFF	OFF	NG
075	IQ-FAX	1:ON / 2:OFF	OFF	OK
076	FAX tone	1:ON / 2:OFF	ON	OK
077	Auto answer mode	1:TAD/FAX 2: FAX Only 3:TEL/FAX	TAD/FAX	OK
078	TEL/FAX ring	1 to 4 rings	2	OK
079	Film detection	1:ON / 2:OFF	ON	OK
080	Set default	YES / NO	NO	NG
501	Pause time set	001~600 x 100msec	050	OK
502	Flash time set	01~99 x 10msec	70	OK
503	Dial speed	1:10pps / 2:20 pps	10pps	OK
510	Vox time	1:6sec / 2:4sec	6sec	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100	OK
521	International mode select	1:ON / 2:OFF	ON	OK
522	Auto standby select	1:ON / 2:OFF	ON	OK
523	Receive equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
524	Transmission equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
533	Setting the number of times that message transfere is redialed.	00~99	03	OK
534	Setting of the message transfer/pager call redial interval	001~999	030	OK
550	Memory clear	---------	---------	NG
551	ROM check	---------	---------	NG
552	DTMF signal tone test	ON / OFF	OFF	NG
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	---------	---------	NG
555	Scanner test	---------	---------	NG

Code	Function	Set Value	Default	Remote Setting
556	Motor test	---------	---------	NG
557	LED test	---------	---------	NG
558	LCD test	---------	---------	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
561	Key test	---------	---------	NG
563	CCD position adjustment	00~30	---------	OK
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00~99	14	OK
572	ITS auto redial line disconnection time set	001~999sec	30	OK
573	Remote turn-on ring number	01~99	15	OK
580	TAM continuous tone detection	1:ON / 2:OFF	ON	OK
590	FAX auto redial time set	00~99	05	OK
591	FAX auto redial line disconnection time set	001~999sec	045	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit value	001~999	100	OK
596	Transmit level set	–15~00dBm	–10	OK
598	Receiving Sensitivity	20~48	43	OK
599	ECM frame size	1:286 byte / 2:64 byte	256 byte	OK
602	Warning list printing	1:ON / 2:OFF	ON	OK
717	Transmit speed select	1:14400/ 2:12000/ 3:9600/ 4:7200/ 5:4800/ 6:2400	14400bps	OK
718	Receive speed select	1:14400/ 2:12000/ 3:9600/ 4:7200/ 5:4800/ 6:2400	14400bps	OK
719	Ringer off in TEL/FAX mode	1:ON / 2:OFF	ON	OK
721	Pause tone detect	1:ON / 2:OFF	ON	OK
722	Redial tone detect	1:ON / 2:OFF	ON	OK
731	CPC mode	1:A / 2:B / 3:OFF	A	OK
732	Auto disconnect	1:350ms / 2:1800ms / 3:OFF	350msec	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	20s	OK
771	T1 timer	1:35s / 2:60s	35s	OK
775	Monitoring of message transfer	1:ON / 2:OFF	OFF	OK
784	Voice prompt	1:Start	---------	NG
815	Sensor & VOX test	---------	---------	NG
841	Digital SP-Phone RX & TX check	1:SP-Phone	---------	NG
852	Print test pattern	---------	---------	NG
853	Top margin	1~9	---------	OK
854	Left margin	1~8	---------	OK
861	A4 size set	1:ON / 2:OFF	OFF	OK
880	History list	1:Start	---------	NG
881	Journal 2	1:Start	---------	NG
882	Journal 3	1:Start	---------	NG
890	TEL/FAX ring back tone	1:ON / 2:OFF	ON	OK
991	Setup list	1:Start	---------	OK
994	Journal list	1:Start	---------	OK
995	Journal 2 list	1:Start	---------	OK
996	Journal 3 list	1:Start	---------	OK
998	History list	1:Start	---------	OK
999	Service list	1:Start	---------	OK

Note: Refer to page 94 for descriptions of the individual codes.

OK means "can set".
NG means "can not set".

For example, the "004 Transmission report mode" set value"1:ERROR/2:ON/3:OFF" number corresponds to the number dialed.

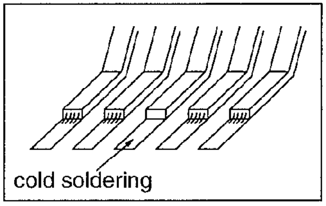
3.3.4 Digital board section

One of most difficult problems to deal with is when the system will not boot up.

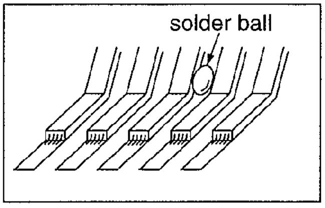
The symptom: No response when the power is turned on. (No LCD display, keys are not accepted.)

Then first thing to do is check the power source. If there is no problem with the power supply unit, then there is a problem with the digital unit (main board).
As there are many potential causes in this case (ASIC, DRAM, etc.), it may be difficult to specify what you should check first. If a mistake is made in the order of checks, a normal part may be determined faulty, wasting both time and money. Although the tendency is to regard the problem as a serious one (IC malfunction, etc.), usually most cases are caused by solder faults (poor contact due to a tunnel in the solder, signal short circuit due to solder waste).

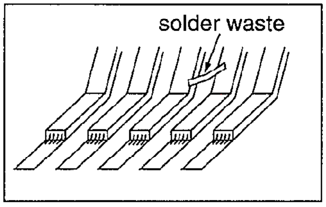
SMT PARTS



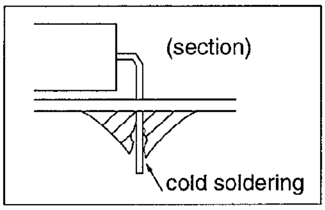
SMT PARTS



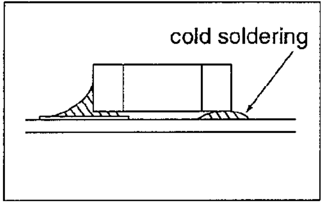
SMT PARTS



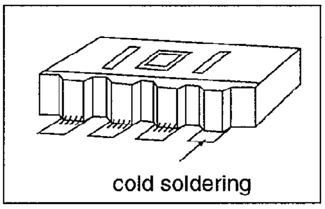
LEADED PARTS



CHIP PARTS (section)



RESISTOR ARRAY



Note:

1. Electrical continuity may have existed at the factory check, but a faulty contact occurred as a result of vibration, etc., during transport.
2. Solder waste remaining on the board may get caught under the IC during transport, causing a short circuit.

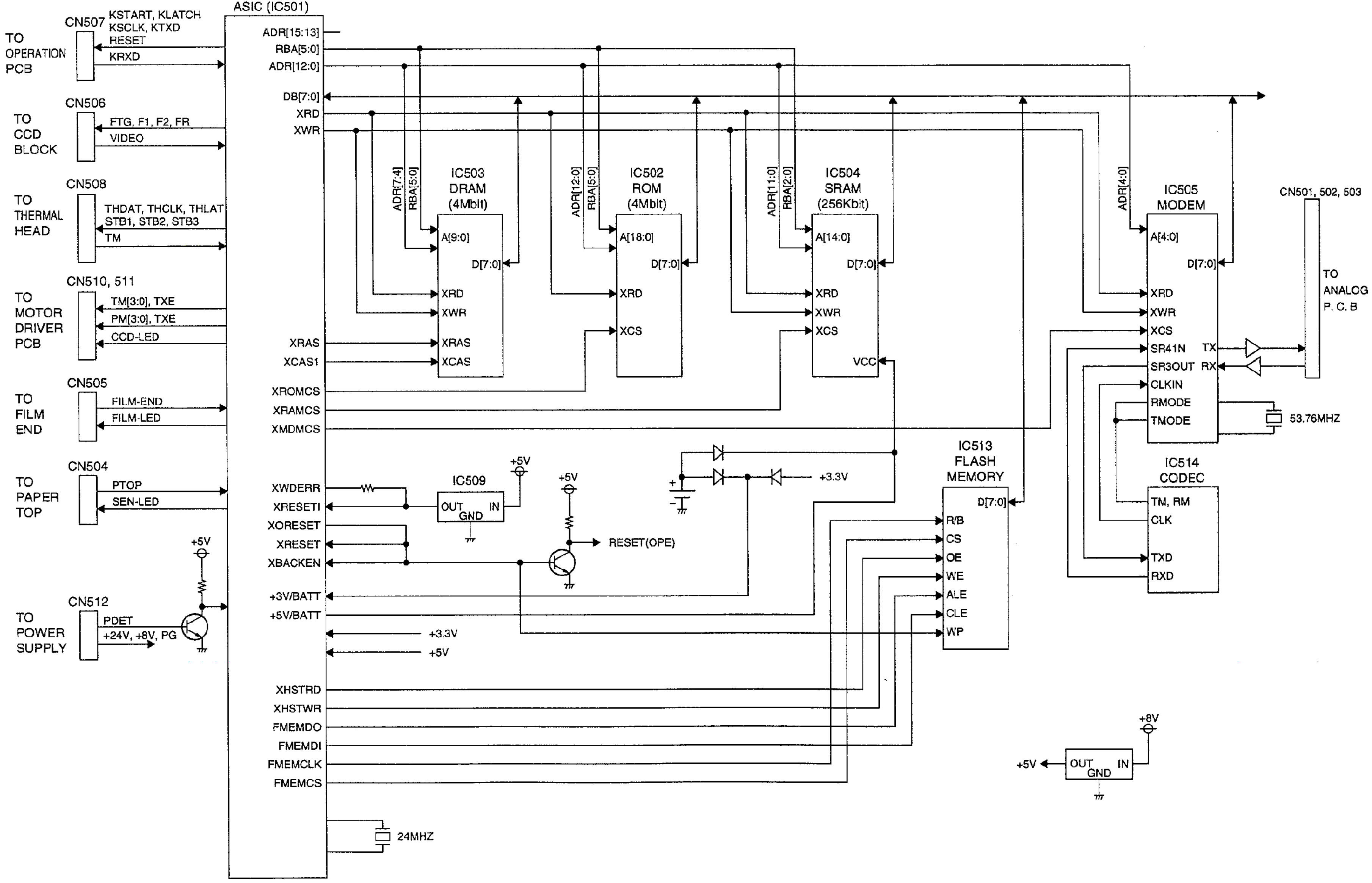
Before we begin mass production, several hundred trial units are produced at the plant, various tests are applied and any malfunctions are analyzed. (In past experiences, digital IC (especially SRAM, DRAM and ROM) malfunctions are extremely rare after installation in the product.)
This may be repaired by replacing the IC, (DRAM etc.). However, the real cause may not have been an IC malfunction but a soldering fault instead.
Soldering faults difficult to detect with the naked eye are common, particularly for ASIC and RA (Resistor Array). But if you have an oscilloscope, you can easily determine the problem site or IC malfunction by checking the main signal lines.
Even if you don't have such a measuring instrument, by checking each main signal line and resoldering it, in many cases the problem will be resolved.
An explanation of the main signals (for booting up the unit) is below.

Don't exchange ICs or stop repairing until checking the signal lines.
An IC malfunction rarely occurs. (By understanding the necessary signals for booting up the unit, the "Not Boot up" display is not a serious problem.)

What are the main signals for booting up the unit?

Please refer to the Block diagram.
The ASIC (IC501) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the ROM (IC502), then follows the instructions for controlling each IC. All ICs have some inner registers that are assigned to a certain address.
It is the address bus by which the ASIC designates the location inside each IC. And the data bus reads or writes the data in order to transmit the instructions from the ASIC to the ICs.
These signal lines are all controlled by voltages of 5V (H) or 0V (L).

Digital Block Diagram


ASIC (IC501)
ADR[15:13]
RBA[5:0]
ADR[12:0]
DB[7:0]
XRD
XWR
XRAS
XCAS1
XROMCS
XRAMCS
XMDMCS
XWDERR
XRESETI
XORESET
XRESET
XBACKEN
+3V/BATT
+5V/BATT
+3.3V
+5V
XHSTRD
XHSTWR
FMEMDO
FMEMDI
FMEMCLK
FMEMCS
24MHZ
TO OPERATION PCB
CN507
KSTART, KLATCH
KSCLK, KTXD
RESET
KRXD
TO CCD BLOCK
CN506
FTG, F1, F2, FR
VIDEO
TO THERMAL HEAD
CN508
THDAT, THCLK, THLAT
STB1, STB2, STB3
TM
TO MOTOR DRIVER PCB
CN510, 511
TM[3:0], TXE
PM[3:0], TXE
CCD-LED
TO FILM END
CN505
FILM-END
FILM-LED
TO PAPER TOP
CN504
PTOP
SEN-LED
TO POWER SUPPLY
CN512
PDET
+24V, +8V, PG
+5V
IC503
DRAM
(4Mbit)
ADR[7:4]
RBA[5:0]
A[9:0]
D[7:0]
XRD
XWR
XRAS
XCAS
IC502
ROM
(4Mbit)
ADR[12:0]
RBA[5:0]
A[18:0]
D[7:0]
XRD
XCS
IC504
SRAM
(256Kbit)
ADR[11:0]
RBA[2:0]
A[14:0]
D[7:0]
XRD
XWR
XCS
VCC
IC505
MODEM
ADR[4:0]
A[4:0]
D[7:0]
XRD
XWR
XCS
SR41N
SR3OUT
CLKIN
RMODE
TMODE
TX
RX
53.76MHZ
CN501, 502, 503
TO ANALOG P. C. B
IC514
CODEC
TM, RM
CLK
TXD
RXD
IC513
FLASH
MEMORY
D[7:0]
R/B
CS
OE
WE
ALE
CLE
WP
IC509
OUT
GND
IN
+5V
+5V
RESET(OPE)
+3.3V
+8V
OUT
GND
IN
+5V

]

The signal lines that must be normal for the system to boot up are listed here [List 1].
For signal lines other than these, even if they malfunction, they do not directly affect booting up the system.

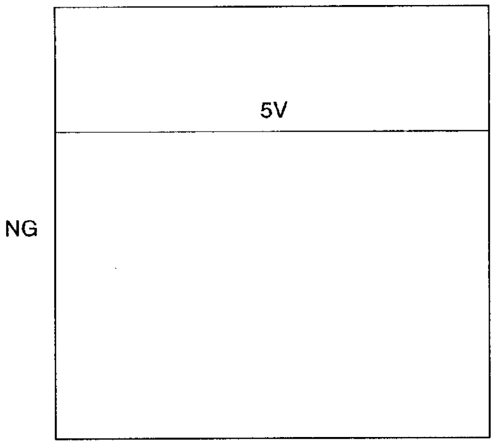
[List 1]

① D0~D7	(Data Bus)
② A0~A15	(Address Bus)
③ $\overline{RD}$	(Read Signal)
$\overline{ROMCS}$	(ROM Select Signal)
$\overline{WR}$	(Write Signal)
$\overline{RAMCS}$	(SRAM Select Signal)
④ RBA0~RBA5	(Bank Address Signal)
⑤ $\overline{RAS}$	(DRAM Row Address Strobe Signal)
$\overline{CAS}$	(DRAM Column Address Strobe Signal)
⑥ $\overline{MDMCS}$	(Modem Select Signal)

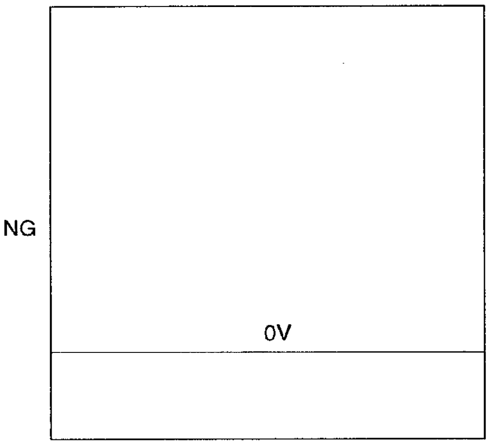
If these signals are normal, once the power is turned on, each IC repeatedly outputs 5V (H) and 0V (L). The following page shows NG and normal wave patterns.

NG Wave pattern (Refer to page 76)

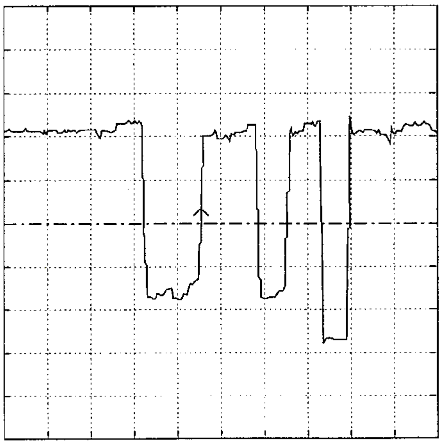
0V never appears.



5V never appears.

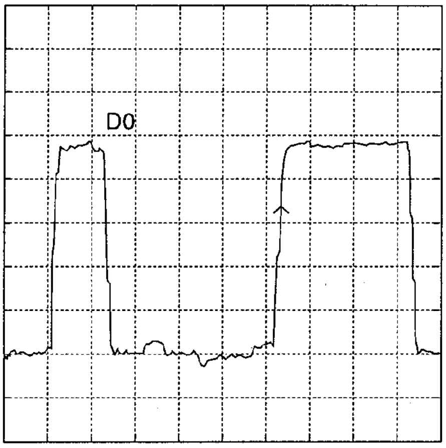


For a short between D0 and D1
500ns/div, 1V/div

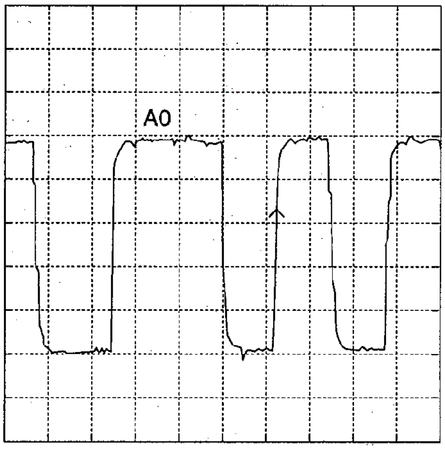


Normal Wave Patterns

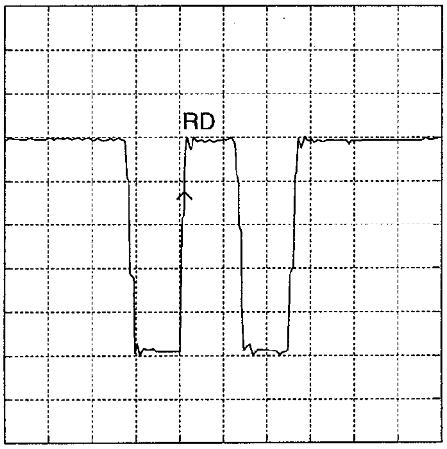
① D0~D7 200ns/div, 1V/div



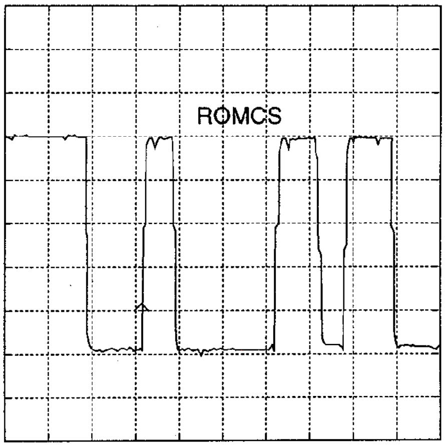
② A0~A5 200ns/div, 1V/div



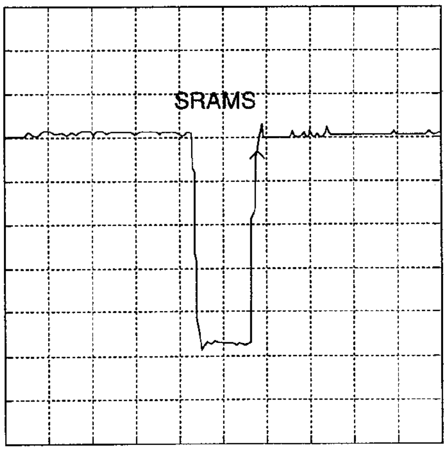
③ $\overline{\text{RD}}$ 100ns/div, 1V/div



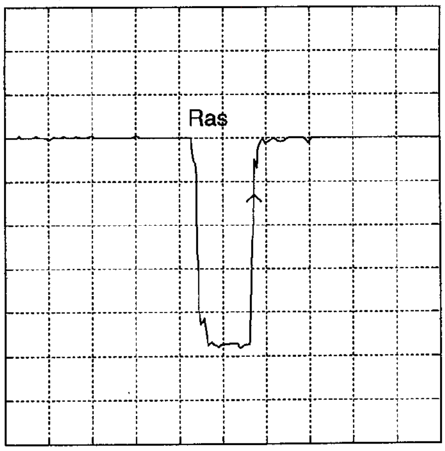
③ $\overline{\text{ROMCS}}$ 500ns/div, 1V/div



③ $\overline{\text{RAMSC}}$ 500ns/div, 1V/div



⑤ $\overline{\text{RAS}}$, $\overline{\text{CAS}}$ 100ns/div, 1V/div

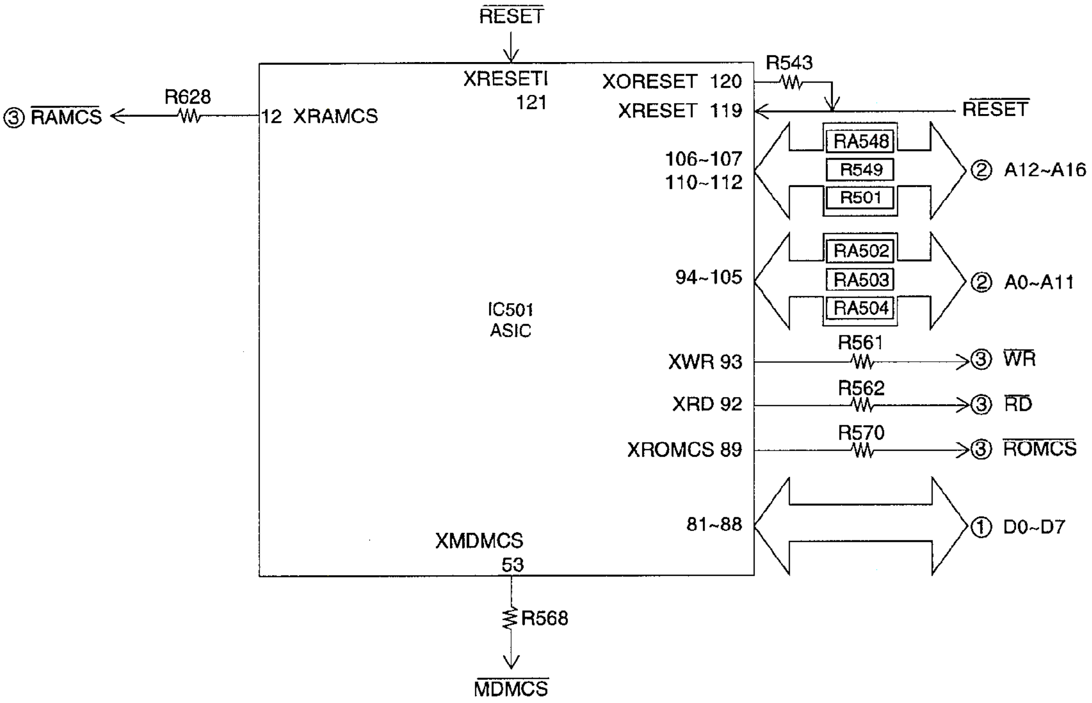


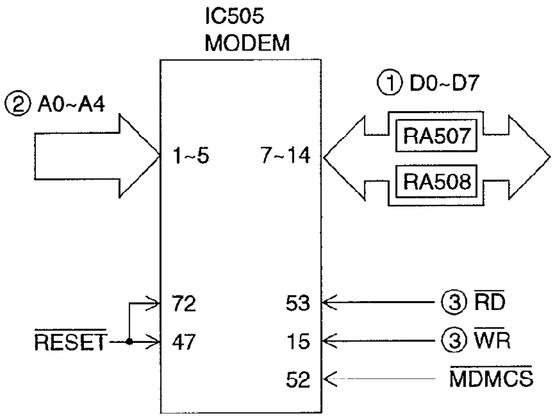
For these reasons and the software sequence to boot up the unit, if you use an oscilloscope to judge whether a signal is OK or NG, you must check in the same order as in [List 1]. (If the ASIC failed to access the ROM, the ASIC cannot access SRAM or DRAM normally.)

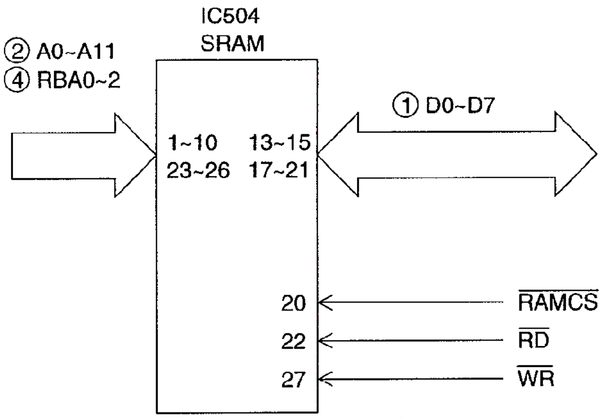
The digital circuit actually operates according to the timing combinations of these signals. So, if the timing of these signals is even slightly off, the circuit will not operate normally. Even of the IC did malfunction, the output voltage level may become abnormal but the timing is accurate according to the specifications. (If oscillation is provided accurately.)
Accordingly, the problem presented here is whether each IC outputs the correct signal. (See the I/O direction diagram on the next page.) In other words, is it constantly switching between 5V (H) and 0V (L) as described earlier.

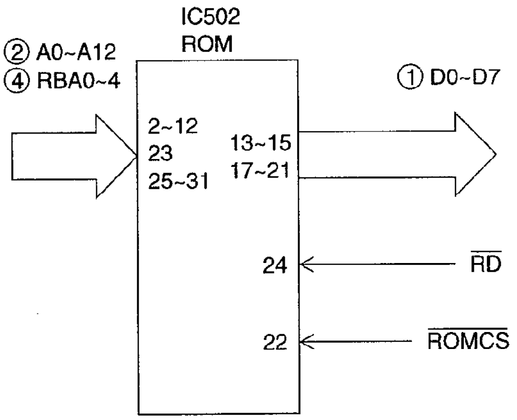
All you have to do is check that the IC repeatedly outputs (H) 5V and (L) 0V.

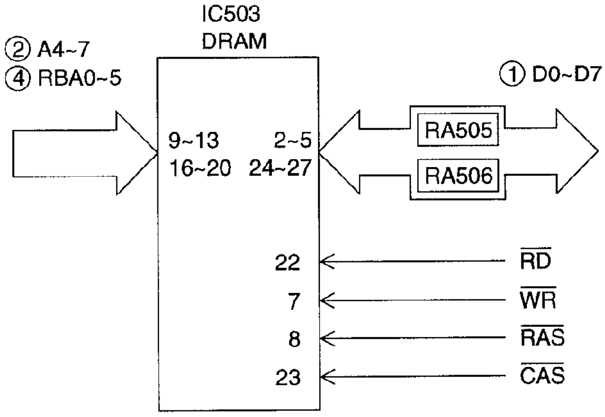
I/O and Pin No. Diagram


RESET
XRESETI
121
XORESET 120
XRESET 119
R543
RESET
③ RAMCS
R628
12 XRAMCS
106~107
110~112
RA548
R549
R501
② A12~A16
94~105
RA502
RA503
RA504
② A0~A11
IC501
ASIC
R561
XWR 93
③ WR
R562
XRD 92
③ RD
R570
XROMCS 89
③ ROMCS
81~88
① D0~D7
XMDMCS
53
R568
MDMCS

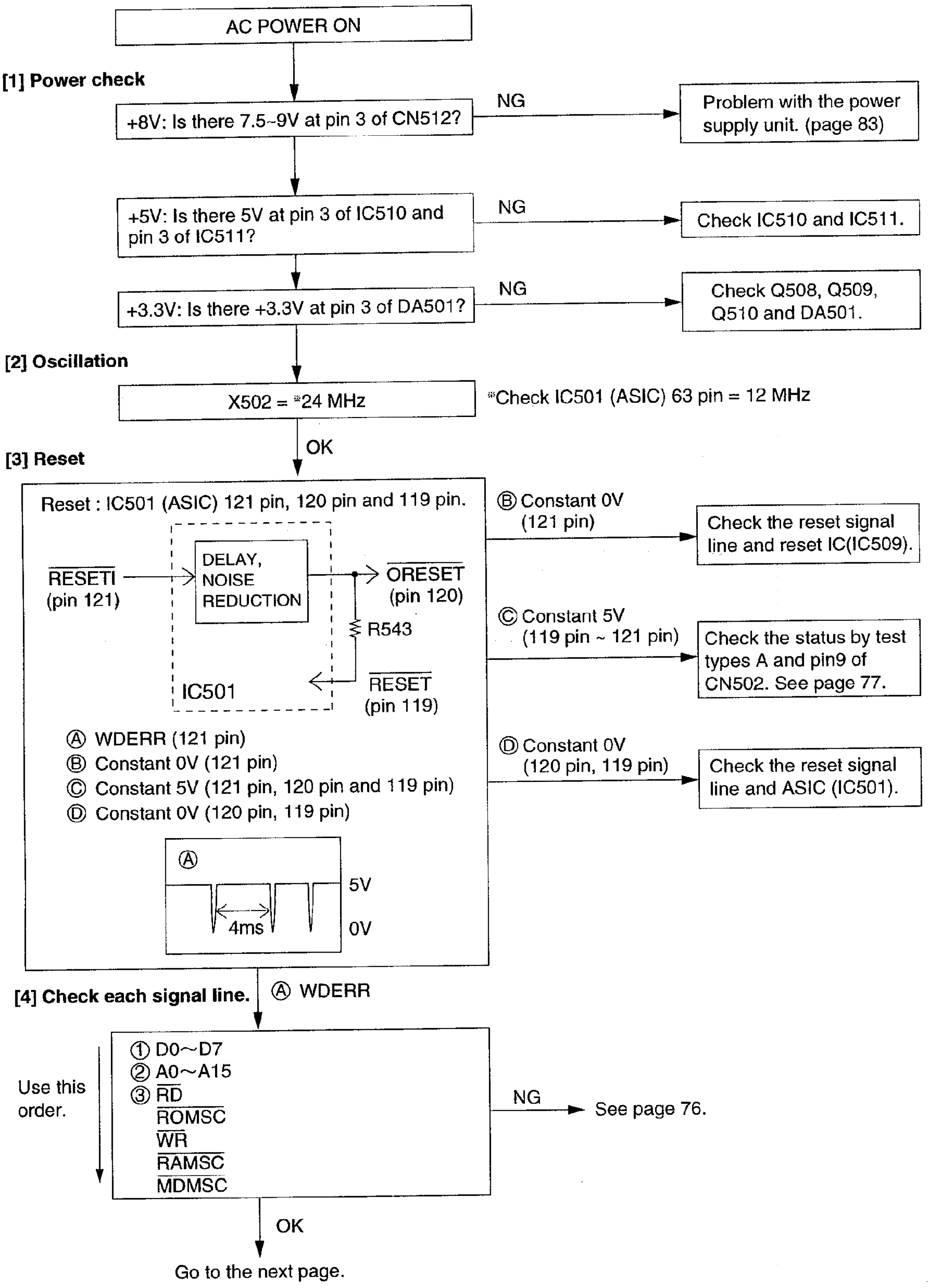

IC505
MODEM
② A0~A4
1~5
7~14
① D0~D7
RA507
RA508
72
47
RESET
53
15
52
③ RD
③ WR
MDMCS

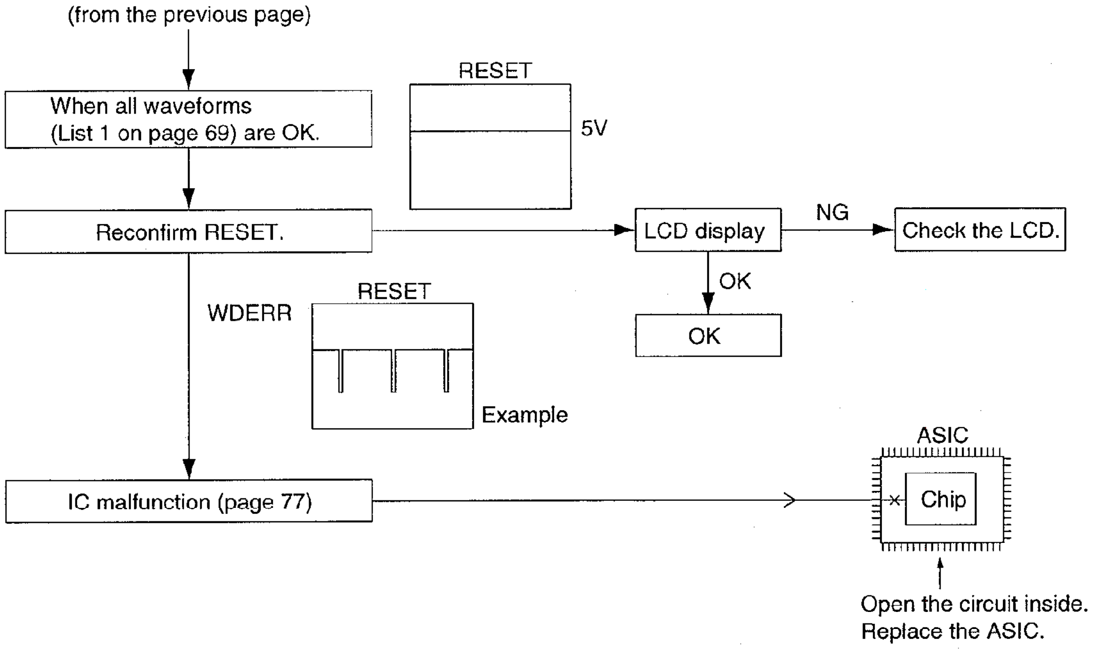

② A0~A11
④ RBA0~2
IC504
SRAM
1~10
23~26
13~15
17~21
① D0~D7
20
22
27
RAMCS
RD
WR


② A0~A12
④ RBA0~4
IC502
ROM
2~12
23
25~31
13~15
17~21
① D0~D7
24
22
RD
ROMCS


② A4~7
④ RBA0~5
IC503
DRAM
9~13
16~20
2~5
24~27
① D0~D7
RA505
RA506
22
7
8
23
RD
WR
RAS
CAS

After the power is turned on, the ASIC initializes and checks each IC.
The ROM, SRAM, and modem are checked.
If initialization fails for the ICs , the system will not boot up.
In this case, please find the cause as follows.


AC POWER ON
[1] Power check
+8V: Is there 7.5~9V at pin 3 of CN512?
NG
Problem with the power supply unit. (page 83)
+5V: Is there 5V at pin 3 of IC510 and pin 3 of IC511?
NG
Check IC510 and IC511.
+3.3V: Is there +3.3V at pin 3 of DA501?
NG
Check Q508, Q509, Q510 and DA501.
[2] Oscillation
X502 = *24 MHz
*Check IC501 (ASIC) 63 pin = 12 MHz
[3] Reset
OK
Reset : IC501 (ASIC) 121 pin, 120 pin and 119 pin.
$\overline{\text{RESETI}}$ (pin 121)
DELAY, NOISE REDUCTION
$\overline{\text{ORESET}}$ (pin 120)
R543
IC501
$\overline{\text{RESET}}$ (pin 119)
Ⓐ WDERR (121 pin)
Ⓑ Constant 0V (121 pin)
Ⓒ Constant 5V (121 pin, 120 pin and 119 pin)
Ⓓ Constant 0V (120 pin, 119 pin)
Ⓐ
5V
4ms
0V
Ⓑ Constant 0V (121 pin)
Check the reset signal line and reset IC(IC509).
Ⓒ Constant 5V (119 pin ~ 121 pin)
Check the status by test types A and pin9 of CN502. See page 77.
Ⓓ Constant 0V (120 pin, 119 pin)
Check the reset signal line and ASIC (IC501).
[4] Check each signal line.
Ⓐ WDERR
Use this order.
① D0~D7
② A0~A15
③ $\overline{\text{RD}}$
$\overline{\text{ROMSC}}$
$\overline{\text{WR}}$
$\overline{\text{RAMSC}}$
$\overline{\text{MDMSC}}$
NG
See page 76.
OK
Go to the next page.


(from the previous page)
When all waveforms (List 1 on page 69) are OK.
RESET
5V
Reconfirm RESET.
LCD display
NG
Check the LCD.
OK
OK
WDERR
RESET
Example
IC malfunction (page 77)
ASIC
Chip
Open the circuit inside.
Replace the ASIC.

Other NG examples while the power is ON and the LCD displays the following.

LCD display CALL SERVICE →

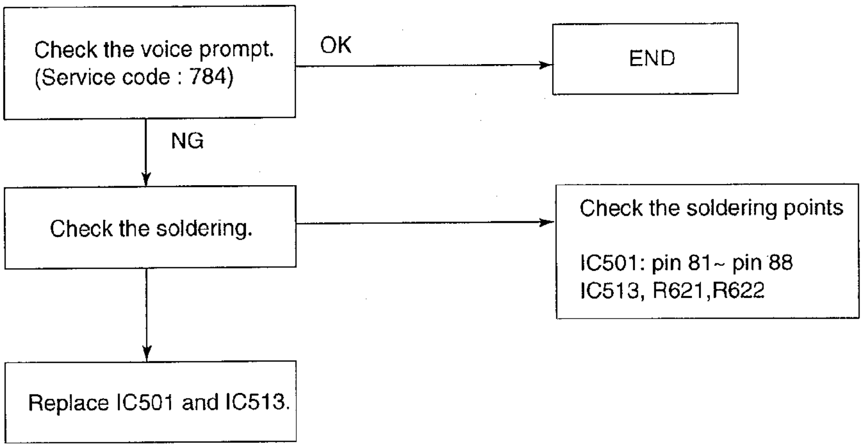
This display occurs when the temperature of the thermistor on the terminal head is NG.
Faulty connection of the thermal head connector.

↓

ASIC IC501 pins 2 and 153 or the thermistor on the thermal head is NG.

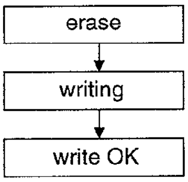
FLASH MEMORY (IC513)

If the unit is working correctly but the VOICE GUIDANCE (voice prompt) is not heard, you should check the Flash Memory.


Check the voice prompt.
(Service code : 784)
OK
END
NG
Check the soldering.
Check the soldering points
IC501: pin 81~ pin 88
IC513, R621,R622
Replace IC501 and IC513.

A voice message is pre-recorded in the Flash Memory (IC513). So, when you find an IC513 malfunction and exchange it with a new one. You have to pre-record the voice message by using a special ROM. How to use the special ROM (Voice Message Recording ROM)

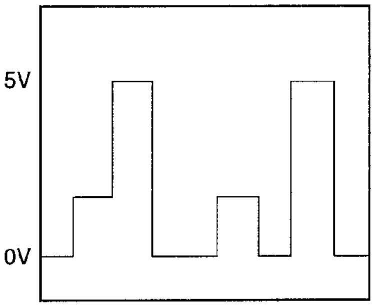
1. Turn the AC power OFF.
2. Exchange the regular system ROM with the special ROM.
3. Turn the AC power ON.
4. The Voice Message Recording starts automatically.
   LCD changes


erase
writing
write OK

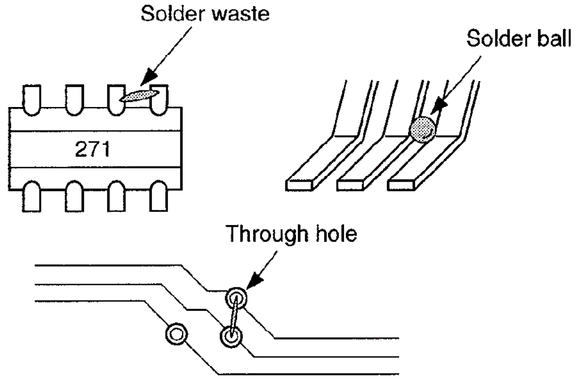
5. Turn the AC power OFF.
6. Exchange the special ROM with the regular system ROM.

NG Example

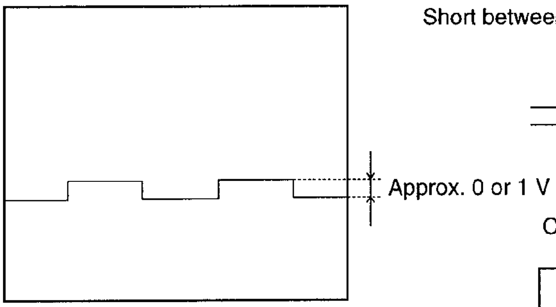
1.



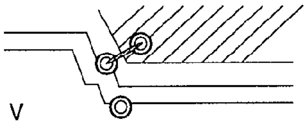
Short circuit from the adjacent signal wires.
Check for a short circuit in the RA and IC leads and the signal wire at the through hole.


Solder waste
Solder ball
271
Through hole

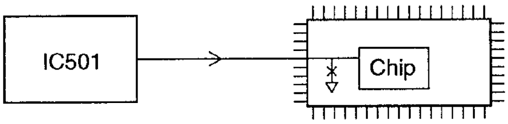
2.



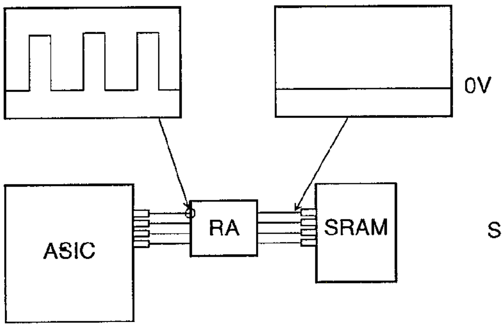
Short between the signal line and GND.



OR IC malfunction

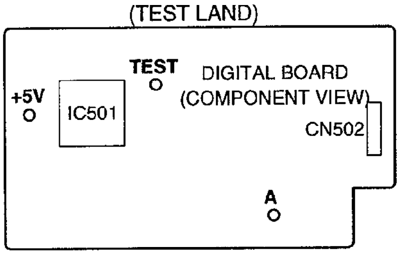

IC503
IC501
Chip

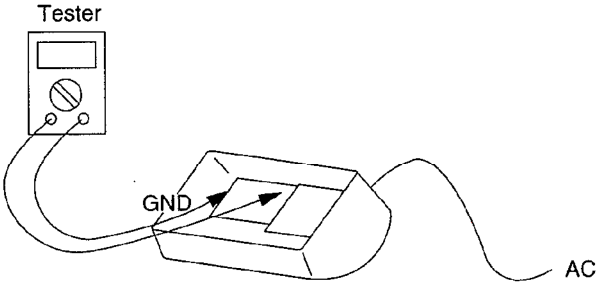
3.


0V
ASIC
RA
SRAM

Solder fault on RA.

Please check the status (voltage) of test lands A, B and C.
These statuses may tell you a defective point.





- Turn off the power supply.
- Short using a metallic object, such as tweezers, between the test and +5V land, and turn on the AC power for few seconds. And then remove a metallic object.
- Check the following voltages using an oscilloscope or tester.
- To cancel the status check mode, turn off the AC power.

Defective point	Check point voltage		Check items
	A	CN502 9 pin	
RTC (IC501)	0V	0V	IC501(RTC is included in IC501)
DRAM (IC503)	0V	5V	IC503(8,23 pin), R566, R567, RA506, RA505, L523, C562, C565, IC501(78, 79 pin)
MODEM (IC505)	5V	0V	IC501(72 pin), IC505(15, 52, 53 pin), R591, R599, C595, C597, C598, L525, L524, RA508, RA507
ALL OK	5V	5V	

•This indicates that the Add/Data Bus, RAM, ROM, MODEM, and ASIC are all connected to the ASIC properly and that control from the ASIC is possible.

Please check the soldering and conduction of these components.
If there is no problem, replace the ICs.

If you still have a problem with the digital board, please refer to page 69.

•To cancel the status check mode, turn off the AC power.

3.3.5 Analog Board Section

The analog parts check is actually different than the digital parts check. The signal route is determined by the purpose of the check. For example, the handset TX route begins from the handset microphone and is output in the telephone line. In this route, it is mainly an analog signal. Tracing the signal can be done easily using an oscilloscope. Each route is shown on the Check Sheet here. If there is a problem with the unit (for example, you cannot communicate with the H/S, etc.), trace the signal in the area and determine the cause.

CHECK SHEET

(SYMPTOM) CHECK ITEMS		Signal IN ► ROUTE ► OUT
SP-PHONE Tx		MIC-CN104(1)-C189-R189-IC103(12-44)-CN101(9)- {CN501(9)-C615-R606-R683-IC514(23-6)-IC505 (82-28, 29)┬ C605-R607 ┬ IC515(5, 6-7)-CN501(8)} -CN101(8)-C135-R150-IC103(48-31)-C132-R147- └ C606-R608 ┘ IC104(6-7)-C152-R163-T101-TEL LINE
SP-PHONE Rx		TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C118-R129-IC101(9-8)-C102- CN101(7)- {CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38-83)-IC514(13-17, 18)┬ C601-R604 ┬ └ C602-R605 ┘ IC516(5, 6-7)-R615-CN501(10)} -CN101(10)-C134-R149-IC103(46-53)-R165-C153-IC103(54-56)-C106- R116-IC102(4-5, 8)-L110, L111-CN105(1, 2)-SPEAKER
HANDSET Tx		HANDSET MIC ┬ CN107(4)-L104-R217-C211 ┬ IC103(21, 22-31)-C132-R147-IC104(6-7)-C152- └ CN107(1)-L101-R218-C212 ┘ R163-T101-TEL LINE
HANDSET Rx		TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-15, 16) ┬ L103 ┬ └ C214-L102 ┘ CN107(2, 3)- HANDSET SPEAKER
DTMF Monitor	Speaker	{IC514(17, 18) ┬ C601-R604 ┬ IC516(5, 6-7)-R615-CN501(10)}-CN101(10)-C134-R149-IC103(46-53)- └ C602-R605 ┘ R165-C153-IC103(54-56)-C106-R116-IC102(4-5, 8)-L110-L111-CN105(1, 2)-SPEAKER
	Handset	{IC505(28, 29) ┬ C605-R607 ┬ IC515(5, 6-7)-CN501(8)}-CN101(8)-C136-R151-IC103(49-15, 16) ┬ L103 ┬ CN107(2, 3)-HANDSET SPEAKER └ C214-L102 ┘
CNG detection		TEL LINE-T101-R144-C138-IC104(2-1)-C126-R114-C105-IC101(1-2)-C102-CN101(7)-{CN501(7)-R617- IC515(2-1)-C611-R603-R629-IC505(38)}
VOX detection		TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C173-R180-IC103(36-38)-R173- C166-R172-IC103(40-42)-CN103(4)-{CN503(4)-IC501(18)}
Greeting for TEL Line MSGS for TEL Line		{IC505(28,29) ┬ C605-R607 ┬ IC515(5, 6-7)-CN501(8)}-C135-R150-IC103(48-31)-C132-R147- └ C606-R608 ┘ IC104(6-7)-C152-R163-T101-TEL LINE

Note:

{ }: Inside the digital board

(SYMPTOM) CHECK ITEMS	IN —Signal— ROUTE → OUT
ICM Rec	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C173-R180-IC103(36-38)-C123-R136-IC101(11-10)-C102-CN101(7)-{CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}
Greeting/ Memo Rec	MIC-CN104(1)-C189-R189-IC103(12-35)-C173-R180-IC103(36-38)-C123-R136-IC101(11-10)-C102-CN101(7)-{CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}
DTMF detection OGM Outputting	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C118-R129-IC101(9-8)-C102-CN101(7)-{CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}
DTMF detection ICM Recording	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C204-IC105(1)
DTMF for TEL Line	{IC505(28, 29) —C605-R607— IC515(5, 6-7)-CN501(8)}-CN101(8)-C135-R150-IC103(48-31)-C132- C606-R608 R147-IC104(6-7)-C152-R163-T101-TEL LINE
FAX Tx	{IC505(28, 29) —C605-R607— IC515(5, 6-7)-CN501(8)}-CN101(8)-C104-R107-C103-IC101(4-3)-C131- C606-R608 R146-IC104(6-7)-C152-R163-T101-TEL LINE
Beep for TEL Line	{IC501(34)-R563-CN501(11)}-CN101(11)-C137-R152-IC103(49-31)-C132-R147-IC104(6-7)-C152-R163-T101-TEL LINE
Dummy Ring Back Tone	{IC501(34)-R563-CN501(11)}-CN101(11)-C137-R152-IC103(49-31)-C132-R147-IC104(6-7)-C152-R163-T101-TEL LINE
Ringing/ Alarm / Beep / Key Tone	{IC501(34)-R563-CN501(11)}-CN101(11)-C142-R156-IC103(52-53)-R165-C153-IC103(54-56)-C106-R116-IC102(4-5, 8)-L110,L111-CN105(1, 2)-SPEAKER
FAX Rx	TEL LINE-T101-R144-C138-IC104(2-1)-C126-R114-C105-IC101(1-2)-C102-CN101(7)-{CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}

Note:

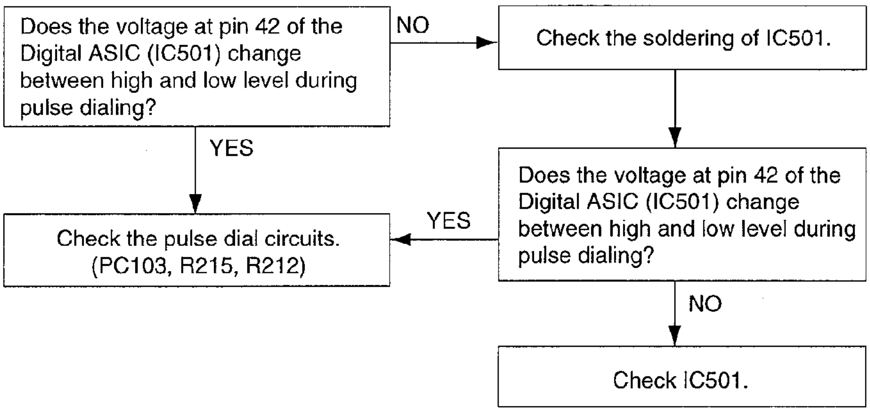
{ }: Inside the digital board

1) Defective ITS (Integrated Telephone System) Section

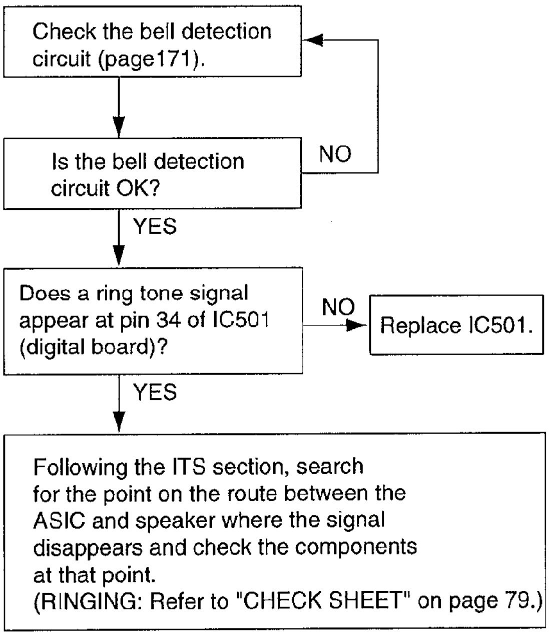
① No handset and speakerphone transmission / reception

Following the ITS section or NCU section, search for the route between the handset microphone and telephone line (sending), or between the telephone line and the handset speaker (receiving), or between the microphone and the telephone line (sending), or between the telephone line and the speaker (receiving) where the signal disappears using the "CHECK SHEET" on pages 78 and 79. Check the components at that point.

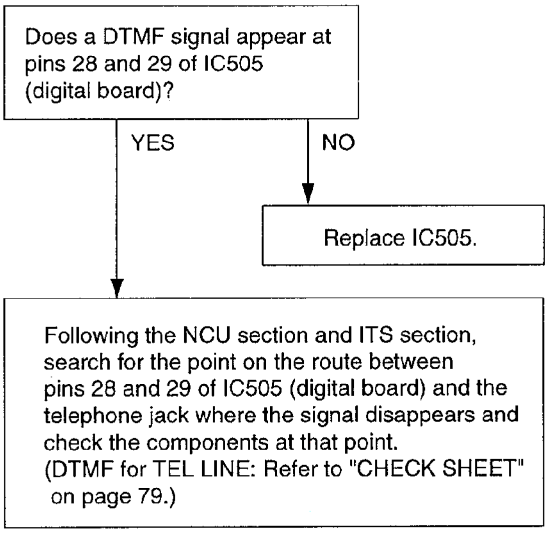
② No pulse dialing


Does the voltage at pin 42 of the Digital ASIC (IC501) change between high and low level during pulse dialing?
NO
Check the soldering of IC501.
YES
Check the pulse dial circuits. (PC103, R215, R212)
YES
Does the voltage at pin 42 of the Digital ASIC (IC501) change between high and low level during pulse dialing?
NO
Check IC501.

③ No ring tone (or No bell)


Check the bell detection circuit (page171).
Is the bell detection circuit OK?
NO
YES
Does a ring tone signal appear at pin 34 of IC501 (digital board)?
NO
Replace IC501.
YES
Following the ITS section, search for the point on the route between the ASIC and speaker where the signal disappears and check the components at that point.
(RINGING: Refer to "CHECK SHEET" on page 79.)

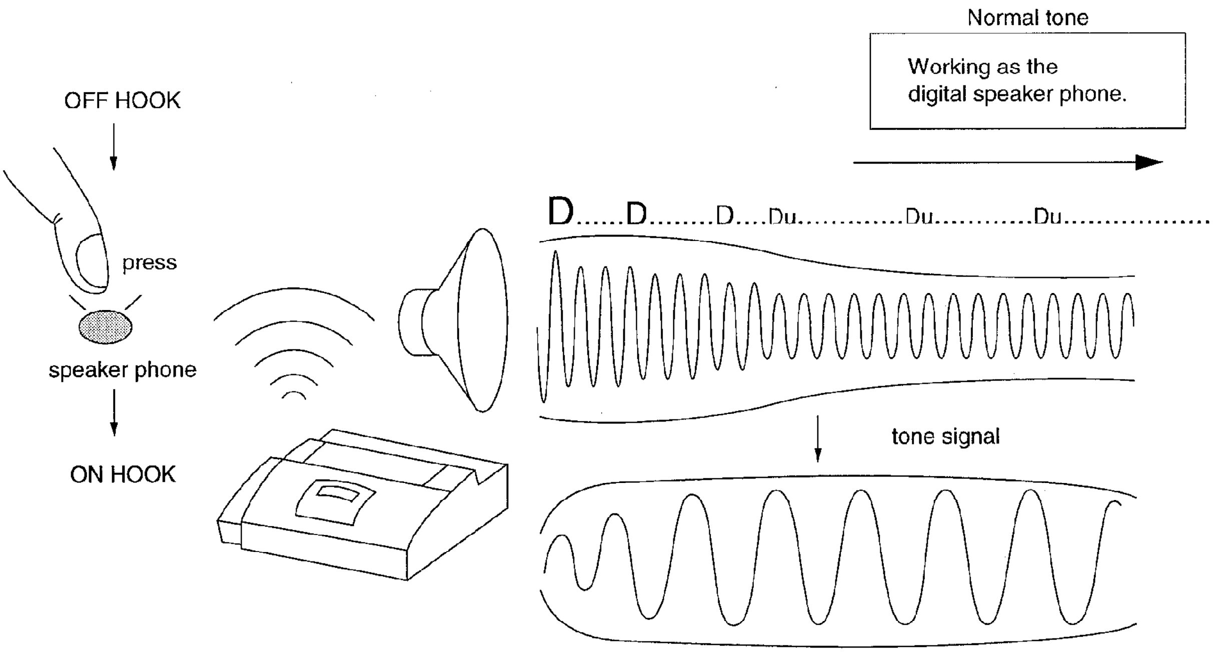
④ No tone dialing


Does a DTMF signal appear at pins 28 and 29 of IC505 (digital board)?
YES
NO
Replace IC505.
Following the NCU section and ITS section, search for the point on the route between pins 28 and 29 of IC505 (digital board) and the telephone jack where the signal disappears and check the components at that point.
(DTMF for TEL LINE: Refer to "CHECK SHEET" on page 79.)

3.3.6. Digital speakerphone section

The digital speaker phone is different from the analog speaker phone.
The previous type (analog speaker phone) switches between Tx or Rx. Either Tx or Rx is able to pass through a telephone line or speaker, depending on the Tx and Rx signal (voice) level. The larger one can pass through the route for that signal. Therefore, you never hear the other party's voice while you are talking. But with the digital speaker phone feature, you can hear the other party's voice while you are talking. So both Tx and Rx are active at the same time. Troubleshooting is also different from the previous type.

At the start of communication, for the initial 2~3 exchanges the digital speakerphone performs half-duplex operation, alternating between transmission (Tx) and reception (Rx). Then duplex communication becomes possible.
Learning occurs during the initial 2~3 exchanges of communication in order to set the appropriate parameters for duplex communication.



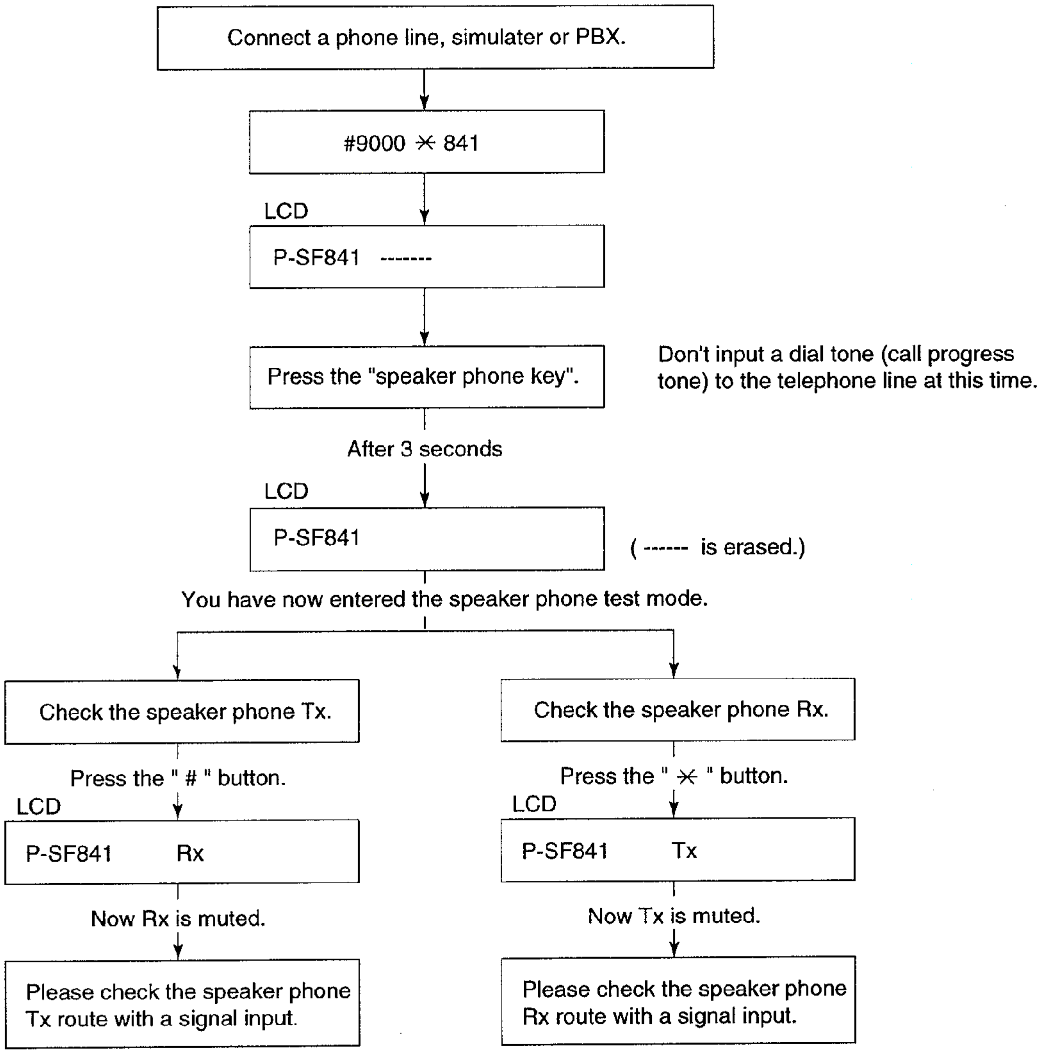
You cannot check the digital speaker phone by the previous method (signal route) because the level is changing as stated above.

Therefore, there is a service function for this troubleshooting. In this service mode, you can set the mute to either Tx or Rx. Then you can check the signal route of the speaker phone Tx or speaker phone Rx without any disturbances.

KX-FP270

HOW TO USE THE **841** SERVICE FUNCTION for THE DIGITAL SPEAKER PHONE

Please check by using the service function #9000 ✱ **841.**



Connect a phone line, simulater or PBX.

#9000 ✱ 841

LCD

P-SF841 -------

Press the "speaker phone key".

Don't input a dial tone (call progress tone) to the telephone line at this time.

After 3 seconds

LCD

P-SF841

(------ is erased.)

You have now entered the speaker phone test mode.

Check the speaker phone Tx.

Press the " # " button.

LCD

P-SF841 Rx

Now Rx is muted.

Please check the speaker phone Tx route with a signal input.

Check the speaker phone Rx.

Press the " ✱ " button.

LCD

P-SF841 Tx

Now Tx is muted.

Please check the speaker phone Rx route with a signal input.

(SYMPTOM) CHECK ITEMS	SIGNAL ROUTE IN ──► ──► OUT
SP-PHONE Tx	MIC-CN104(1)-C189-R189-IC103(12-44)-CN101(9)- {CN501(9)-C615-R606-R683-IC514(23-6)-IC505(82-28, 29) ┬ C605-R607 ┬ IC515(5, 6-7)-CN501(8)} -CN101(8)-C135-R150- └ C606-R608 ┘ IC103(48-31)-C132-R147-IC104(6-7)-C152-R163-T101-TEL LINE
SP-PHONE Rx	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C118-R129-IC101(9-8)-C102-CN101(7)- {CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38-83)-IC514 (13- 17, 18) ┬ C601-R604 ┬ IC516(5, 6-7)-R615-CN501(10)} -CN101(10)-C134-R149-IC103 └ C602-R605 ┘ (46-53)-R165-C153-IC103(54-56)-C106-R116-IC102(4-5, 8)-L110, L111-CN105(1, 2)-SPEAKER

Note:

{ }: Inside the digital board

3.3.7 Power Supply Board Section

(1) Key components for troubleshooting

The following components have been known to break frequently :

F101, D101-D104, C106, Q101, PC101, IC101, F201.

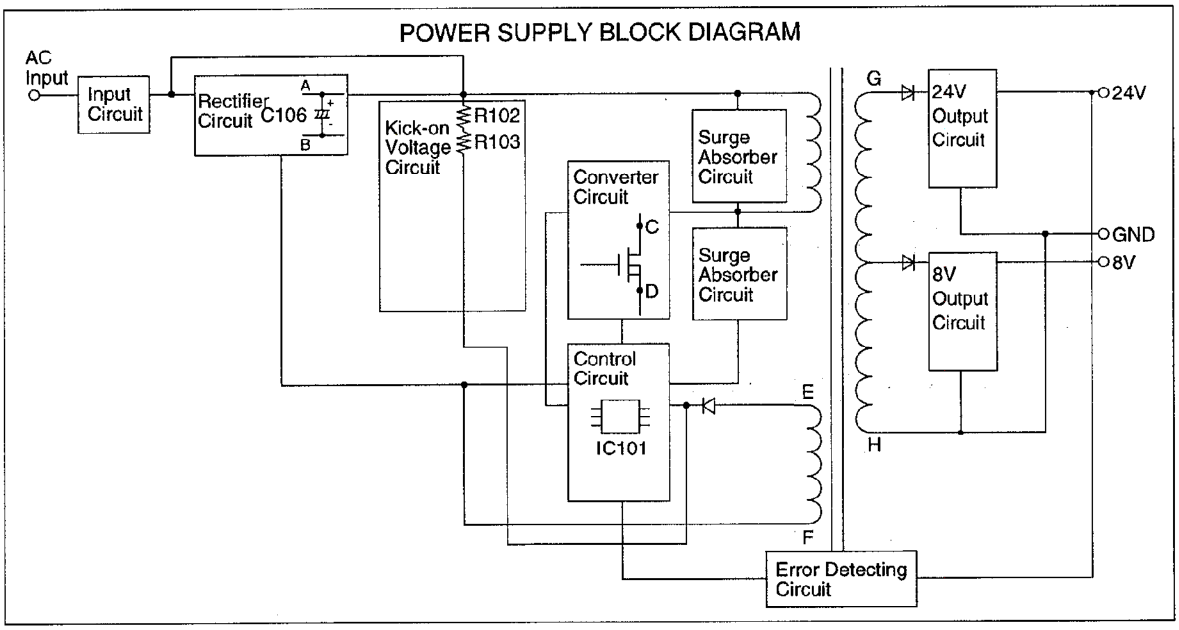
This comes from our experience with experimental tests. For example : power supply, lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

Caution:

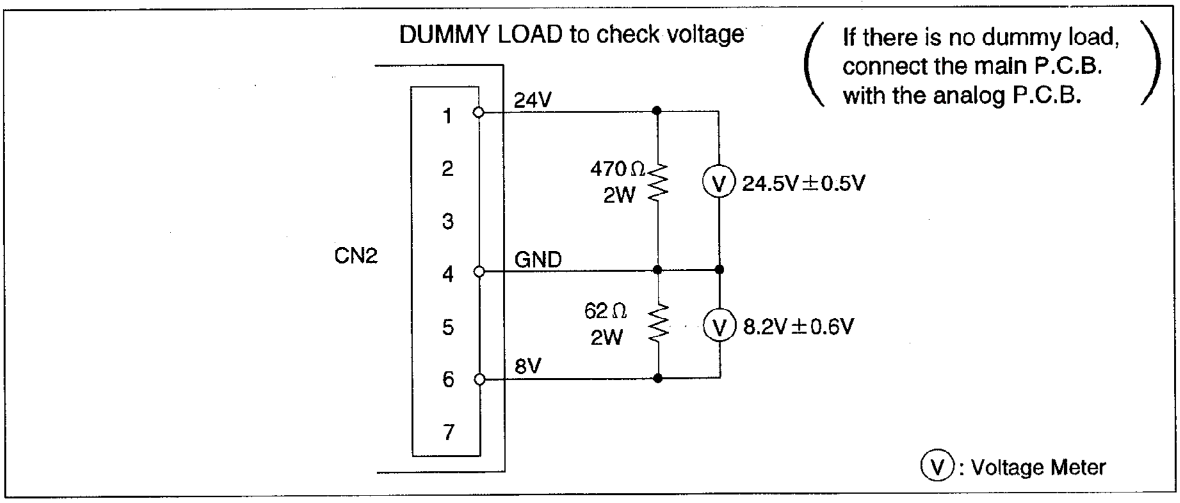
If you find a melted fuse in the unit, don't turn the power on without repairing the unit first. (Except for the fuse.) If you do, the fuse will melt again and the unit has not been repaired. The problem exists somewhere else.

In most cases, (our experience) the symptom is that nothing is output.

There is a high possibility in the primary side more than the secondary side.


POWER SUPPLY BLOCK DIAGRAM

AC Input
Input Circuit
Rectifier Circuit
C106
A
B
Kick-on Voltage Circuit
R102
R103
Converter Circuit
C
D
Surge Absorber Circuit
Surge Absorber Circuit
Control Circuit
IC101
E
F
G
H
24V Output Circuit
8V Output Circuit
24V
GND
8V
Error Detecting Circuit


DUMMY LOAD to check voltage

(If there is no dummy load, connect the main P.C.B. with the analog P.C.B.)

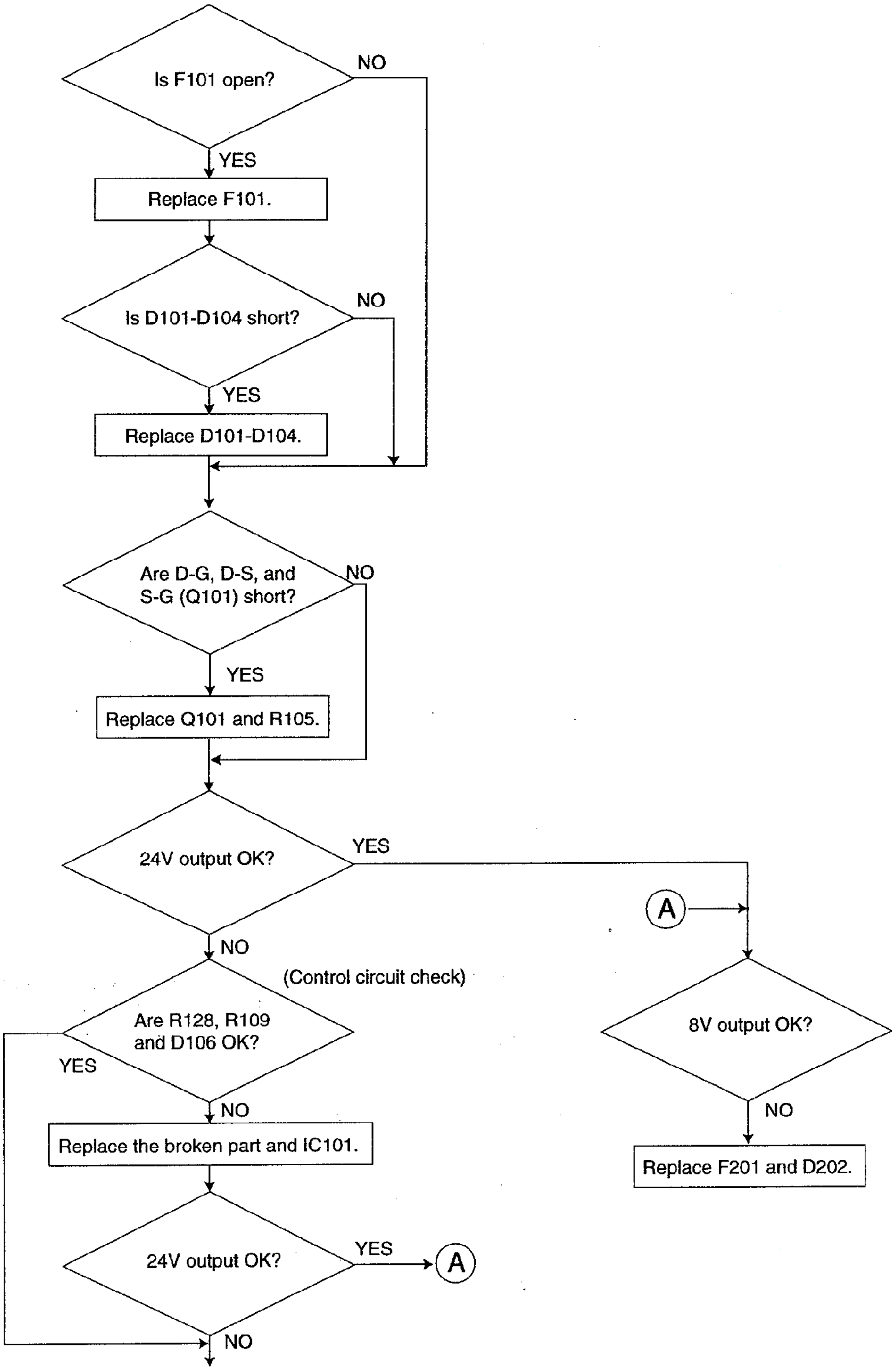
CN2
1
2
3
4
5
6
7
24V
GND
8V
470Ω 2W
62Ω 2W
V 24.5V±0.5V
V 8.2V±0.6V
V: Voltage Meter

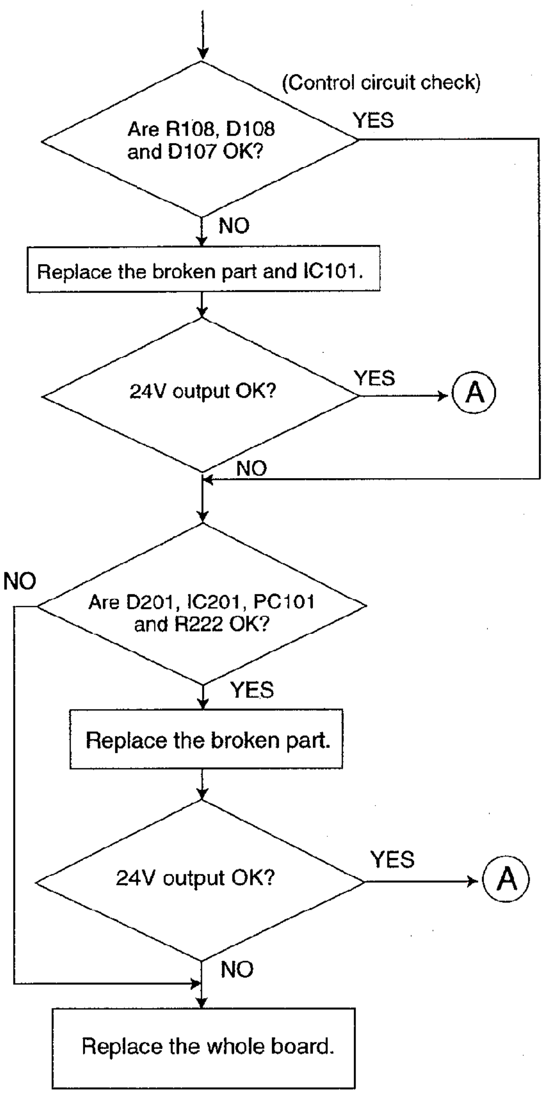
(2) Troubleshooting Flow Chart

Our recommendation for troubleshooting is as follows.

This procedure comes from our experience of troubleshooting in our lab.

※ Before turning on the power supply, you should check F101.


Is F101 open?
NO
YES
Replace F101.
Is D101-D104 short?
NO
YES
Replace D101-D104.
Are D-G, D-S, and S-G (Q101) short?
NO
YES
Replace Q101 and R105.
24V output OK?
YES
NO
(Control circuit check)
Are R128, R109 and D106 OK?
YES
NO
Replace the broken part and IC101.
24V output OK?
YES
A
NO
A
8V output OK?
NO
Replace F201 and D202.


(Control circuit check)
Are R108, D108 and D107 OK?
YES
NO
Replace the broken part and IC101.
24V output OK?
YES
A
NO
NO
Are D201, IC201, PC101 and R222 OK?
YES
Replace the broken part.
24V output OK?
YES
A
NO
Replace the whole board.

(3) Broken parts repair details

(D101, D102, D103, D104)

Check for a short-circuit in terminal 4. If D101, D102, D103 and D104 are short-circuited, F101 will melt (open). In this case, replace all of the parts (D101, D102, D103, D104, F101).

(Q101)

The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q101.

This is due to a very high voltage through the Gate circuit which is composed of R128, R109, D106 and IC101. You should change all of the parts listed as follows.

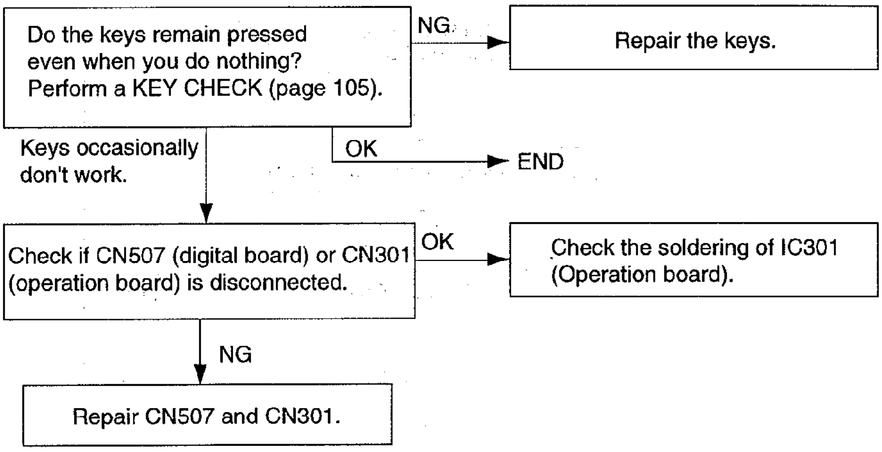
F101, Q101, R128, R109, D106, IC101

(D201)

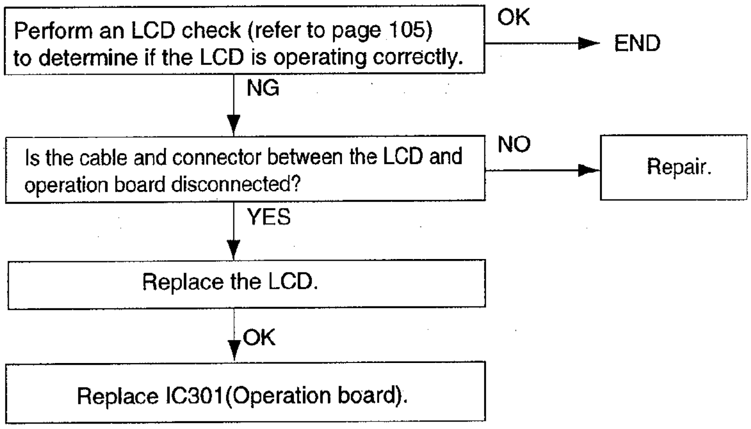
If D201 is broken, the oscillation circuit in the power supply cannot operate. Check it with an electric tester.

3.3.8 Operation Panel Section

① No key operation


Do the keys remain pressed even when you do nothing? Perform a KEY CHECK (page 105).
NG
Repair the keys.
Keys occasionally don't work.
OK
END
Check if CN507 (digital board) or CN301 (operation board) is disconnected.
OK
Check the soldering of IC301 (Operation board).
NG
Repair CN507 and CN301.

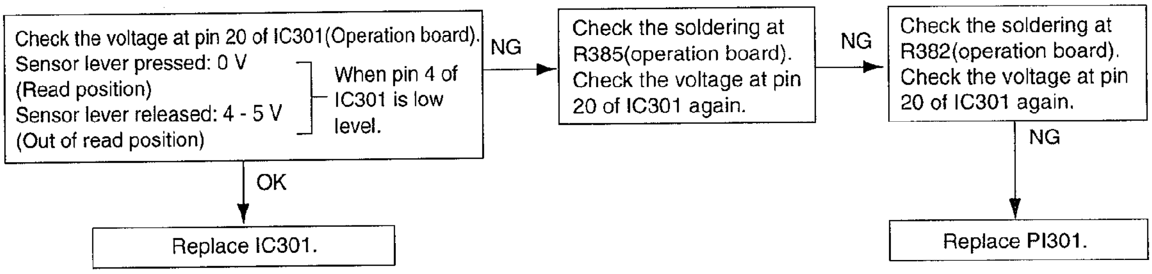
② No LCD indication


Perform an LCD check (refer to page 105) to determine if the LCD is operating correctly.
OK
END
NG
Is the cable and connector between the LCD and operation board disconnected?
NO
Repair.
YES
Replace the LCD.
OK
Replace IC301(Operation board).

3.3.9 Sensor Board Section (Refer to pages 157 - 161 for the circuit descriptions.)

Perform an SENSOR CHECK (815: refer to page 106) to determine if the sensor is operating correctly.

① Check the read position sensor (PI301) ·········· "REMOVE DOCUMENT"



Check the voltage at pin 20 of IC301(Operation board).
Sensor lever pressed: 0 V (Read position)
Sensor lever released: 4 - 5 V (Out of read position)
When pin 4 of IC301 is low level.

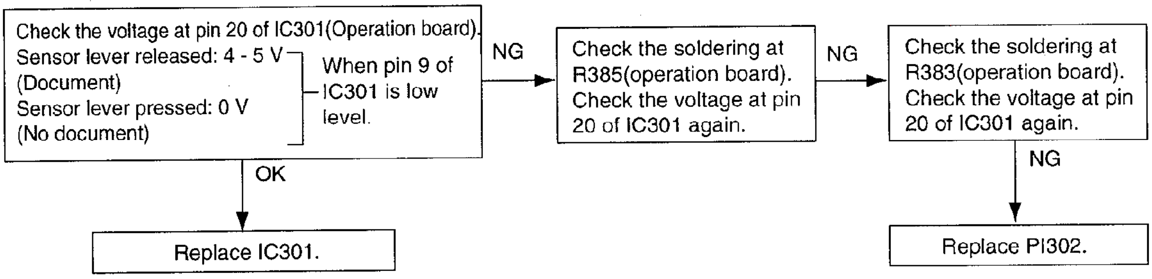
OK → Replace IC301.

NG → Check the soldering at R385(operation board). Check the voltage at pin 20 of IC301 again.

NG → Check the soldering at R382(operation board). Check the voltage at pin 20 of IC301 again.

NG → Replace PI301.

② Check the document sensor (PI302) ·············· "CHECK DOCUMENT"



Check the voltage at pin 20 of IC301(Operation board).
Sensor lever released: 4 - 5 V (Document)
Sensor lever pressed: 0 V (No document)
When pin 9 of IC301 is low level.

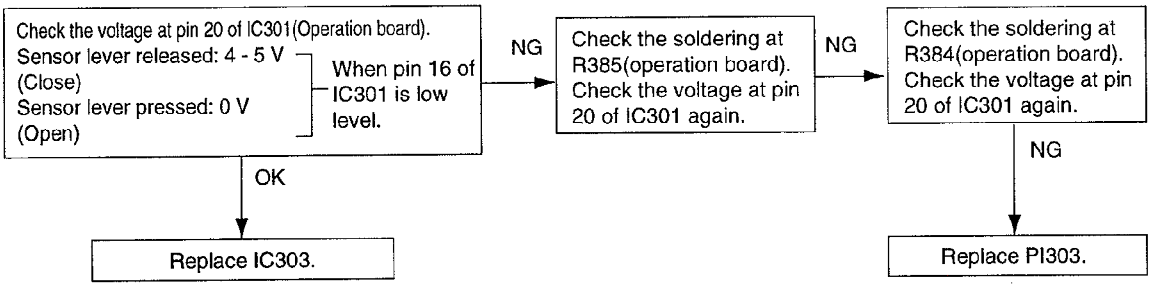
OK → Replace IC301.

NG → Check the soldering at R385(operation board). Check the voltage at pin 20 of IC301 again.

NG → Check the soldering at R383(operation board). Check the voltage at pin 20 of IC301 again.

NG → Replace PI302.

③ Check the cover open sensor (PI303) ············ "CHECK COVER"



Check the voltage at pin 20 of IC301(Operation board).
Sensor lever released: 4 - 5 V (Close)
Sensor lever pressed: 0 V (Open)
When pin 16 of IC301 is low level.

OK → Replace IC303.

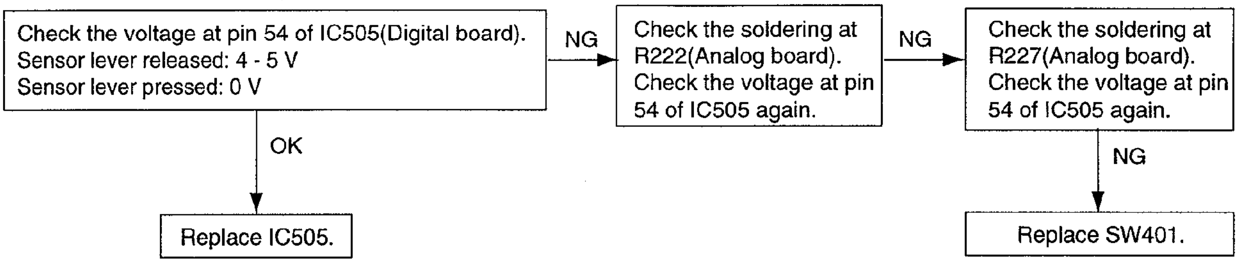
NG → Check the soldering at R385(operation board). Check the voltage at pin 20 of IC301 again.

NG → Check the soldering at R384(operation board). Check the voltage at pin 20 of IC301 again.

NG → Replace PI303.

KX-FP270

④ Check the hook switch (SW401)


Check the voltage at pin 54 of IC505(Digital board).
Sensor lever released: 4 - 5 V
Sensor lever pressed: 0 V

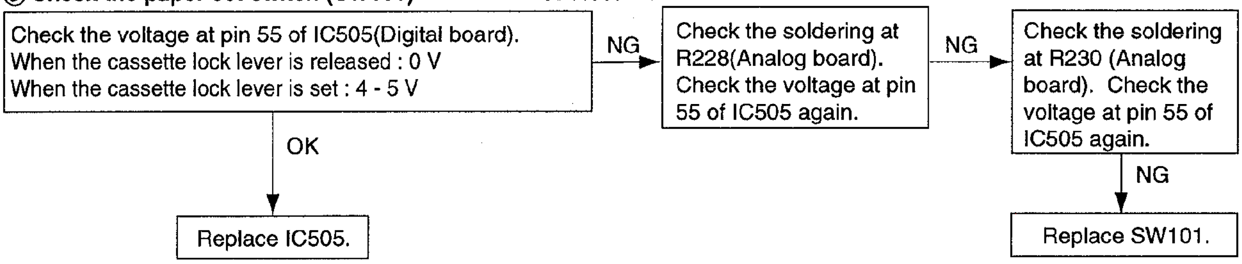
OK → Replace IC505.

NG → Check the soldering at R222(Analog board). Check the voltage at pin 54 of IC505 again.

NG → Check the soldering at R227(Analog board). Check the voltage at pin 54 of IC505 again.

NG → Replace SW401.

⑤ Check the paper set switch (SW101) ············ "CHECK LEVER"


Check the voltage at pin 55 of IC505(Digital board).
When the cassette lock lever is released : 0 V
When the cassette lock lever is set : 4 - 5 V

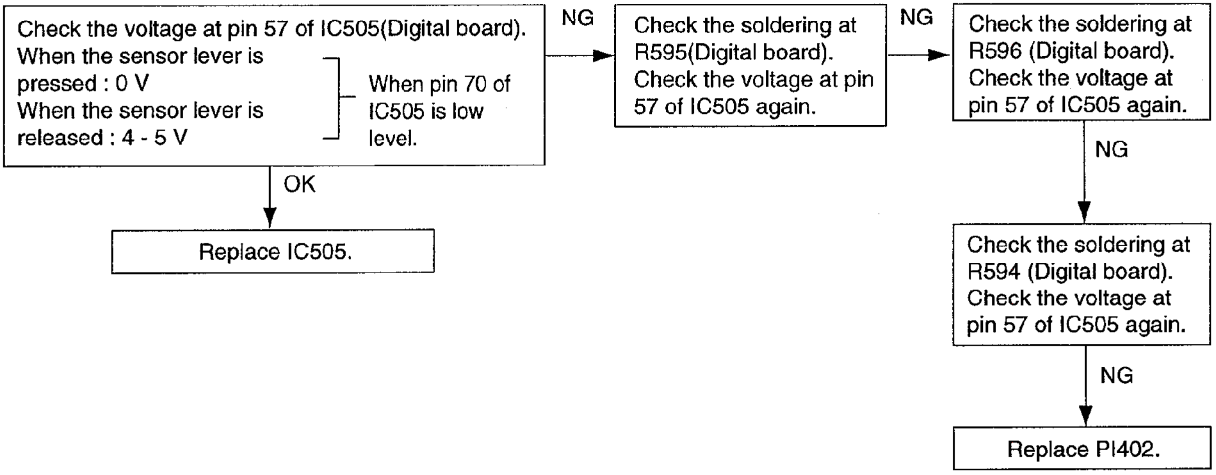
OK → Replace IC505.

NG → Check the soldering at R228(Analog board). Check the voltage at pin 55 of IC505 again.

NG → Check the soldering at R230 (Analog board). Check the voltage at pin 55 of IC505 again.

NG → Replace SW101.

⑥ Check the paper top sensor (PI402) ············ "PAPER JAMMED"


Check the voltage at pin 57 of IC505(Digital board).
When the sensor lever is pressed : 0 V
When the sensor lever is released : 4 - 5 V
When pin 70 of IC505 is low level.

OK → Replace IC505.

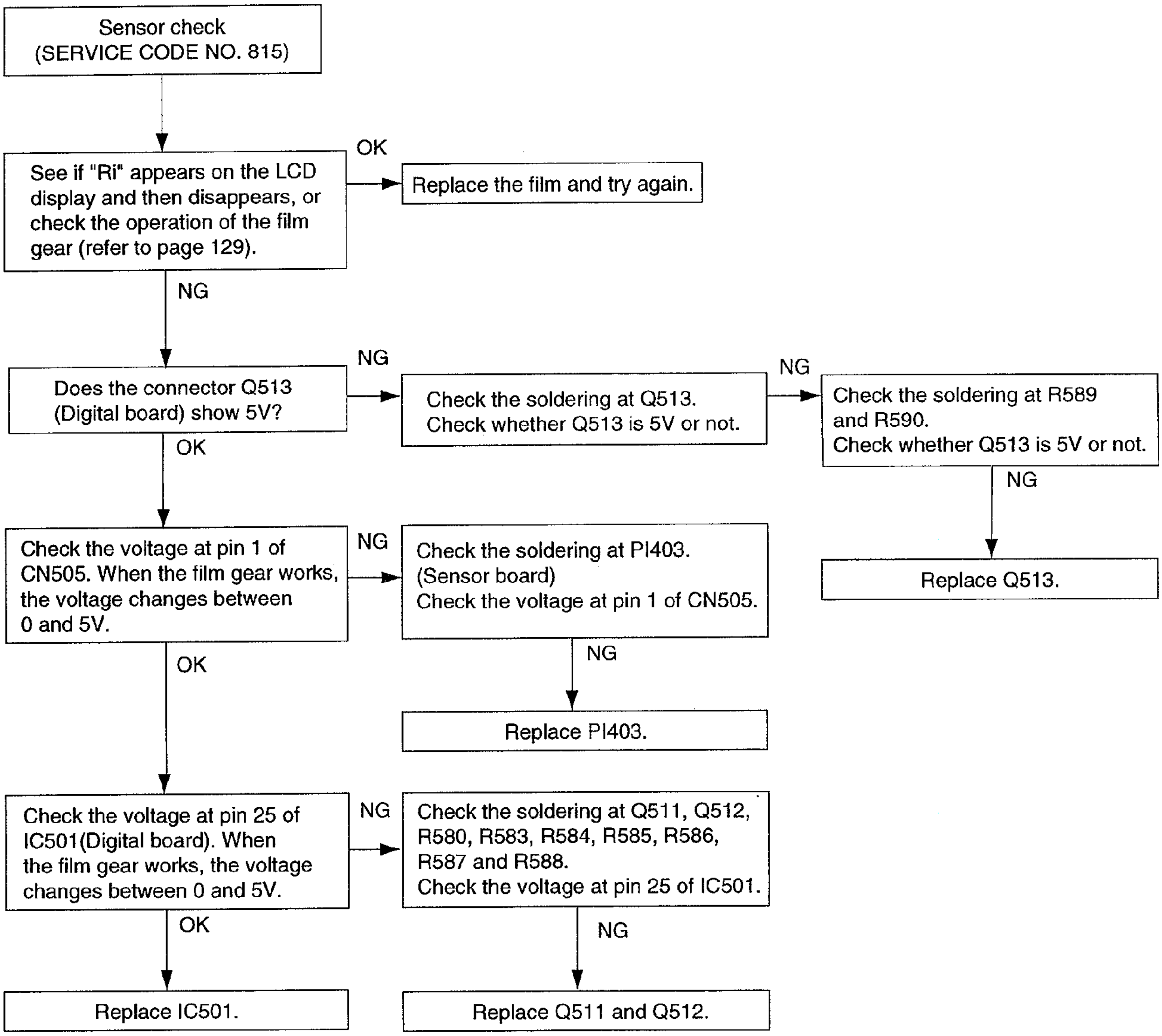
NG → Check the soldering at R595(Digital board). Check the voltage at pin 57 of IC505 again.

NG → Check the soldering at R596 (Digital board). Check the voltage at pin 57 of IC505 again.

NG → Check the soldering at R594 (Digital board). Check the voltage at pin 57 of IC505 again.

NG → Replace PI402.

⑦ Check the film end sensor (PI403) ·········· "FILM EMPTY"


Sensor check
(SERVICE CODE NO. 815)
See if "Ri" appears on the LCD display and then disappears, or check the operation of the film gear (refer to page 129).
OK
Replace the film and try again.
NG
Does the connector Q513 (Digital board) show 5V?
NG
Check the soldering at Q513.
Check whether Q513 is 5V or not.
NG
Check the soldering at R589 and R590.
Check whether Q513 is 5V or not.
NG
Replace Q513.
OK
Check the voltage at pin 1 of CN505. When the film gear works, the voltage changes between 0 and 5V.
NG
Check the soldering at PI403.
(Sensor board)
Check the voltage at pin 1 of CN505.
NG
Replace PI403.
OK
Check the voltage at pin 25 of IC501(Digital board). When the film gear works, the voltage changes between 0 and 5V.
NG
Check the soldering at Q511, Q512, R580, R583, R584, R585, R586, R587 and R588.
Check the voltage at pin 25 of IC501.
NG
Replace Q511 and Q512.
OK
Replace IC501.

3.3.10 CCD Board Section

Refer to pages 153 for circuit descriptions.

**The CCD BOARD installed on the CCD UNIT is adjusted precisely in our production line.
Therefore, if the CCD board is reinstalled while making repairs, it must be readjusted after troubleshooting.
(Refer to page 114.)

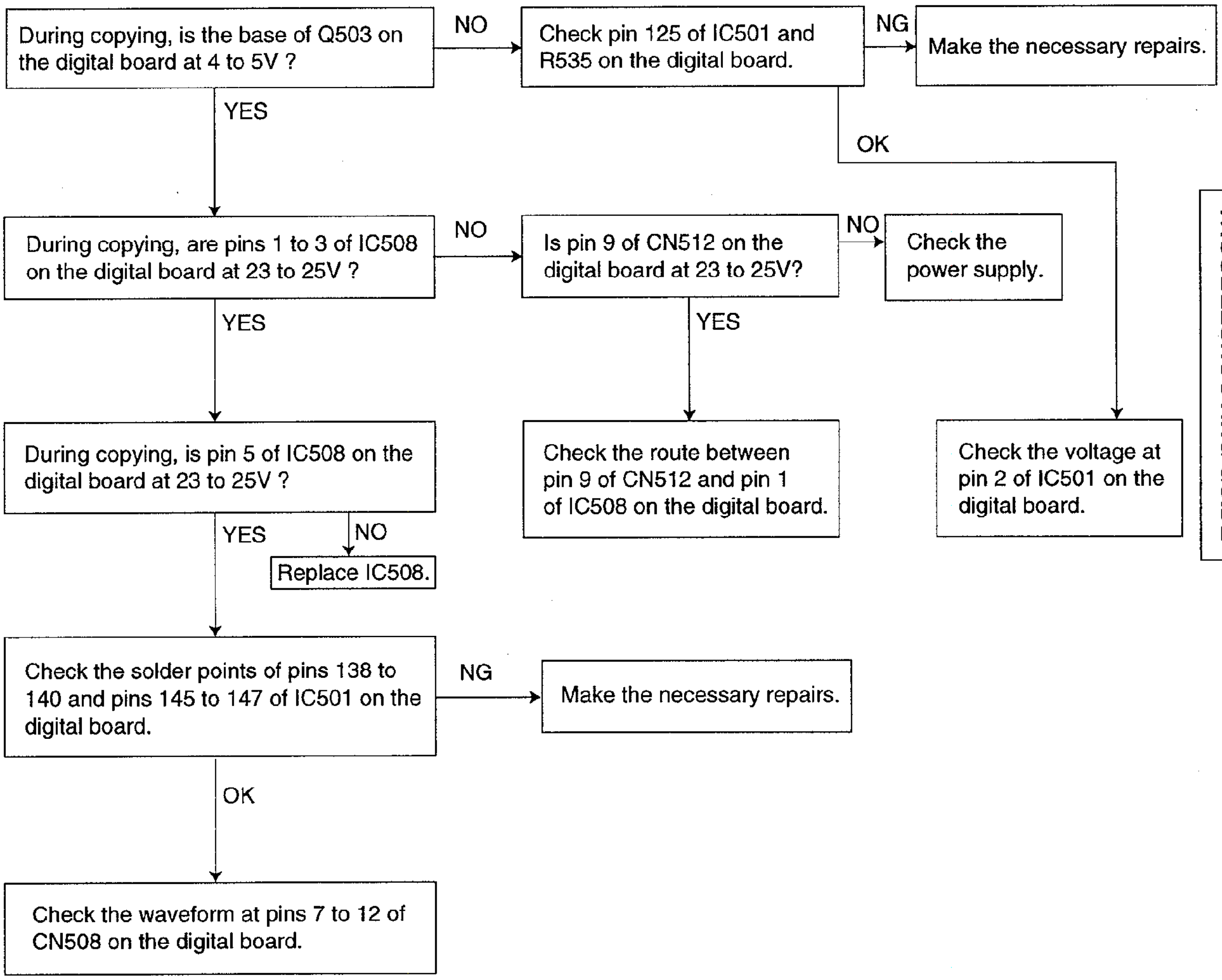
If the printout is correct while receiving test printing but incorrect while copying, the read section may be broken.
This is caused by the CCD UNIT or ASIC (IC501) [Digital board].
First, perform a SCAN CHECK to determine if the LED array lights. (Refer to page 105.)

CONDITION	CAUSE	REMEDY
IC501 outputs the signal for the CCD UNIT correctly. But the CCD UNIT doesn't output an analog image signal.	The CCD board is broken.	Replace the CCD board.
IC501 outputs the signal for the CCD UNIT correctly. But the CCD UNIT outputs an analog image signal correctly.	An analog part in the ASIC is broken.	Replace IC501.
IC501 doesn't output the signal for the CCD UNIT correctly.	A logic part in the ASIC is broken.	Replace IC501.

(Check the connection between IC501 and the CCD board.)

Note: Refer to pages 153 for the timing descriptions.

3.3.11 Thermal Head Section (Refer to page 151 for the thermal head circuit.)


During copying, is the base of Q503 on the digital board at 4 to 5V ?
NO
Check pin 125 of IC501 and R535 on the digital board.
NG
Make the necessary repairs.
OK
YES
During copying, are pins 1 to 3 of IC508 on the digital board at 23 to 25V ?
NO
Is pin 9 of CN512 on the digital board at 23 to 25V?
NO
Check the power supply.
YES
YES
During copying, is pin 5 of IC508 on the digital board at 23 to 25V ?
Check the route between pin 9 of CN512 and pin 1 of IC508 on the digital board.
Check the voltage at pin 2 of IC501 on the digital board.
YES
NO
Replace IC508.
Check the solder points of pins 138 to 140 and pins 145 to 147 of IC501 on the digital board.
NG
Make the necessary repairs.
OK
Check the waveform at pins 7 to 12 of CN508 on the digital board.

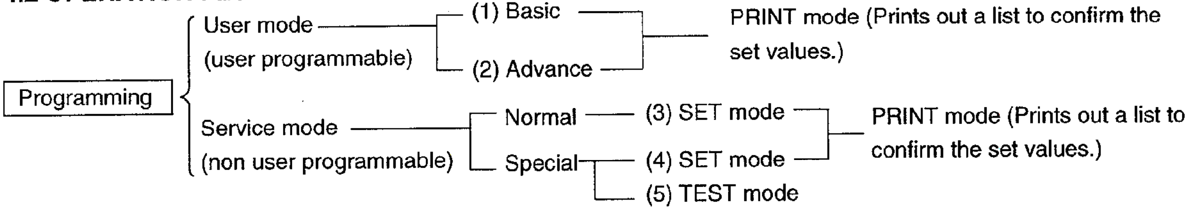
4. PROGRAMMING AND LISTS

The programming functions are used to program the various features and functions of the unit, and to test the unit. This facilitates communication between the user and the service man while programming the unit.

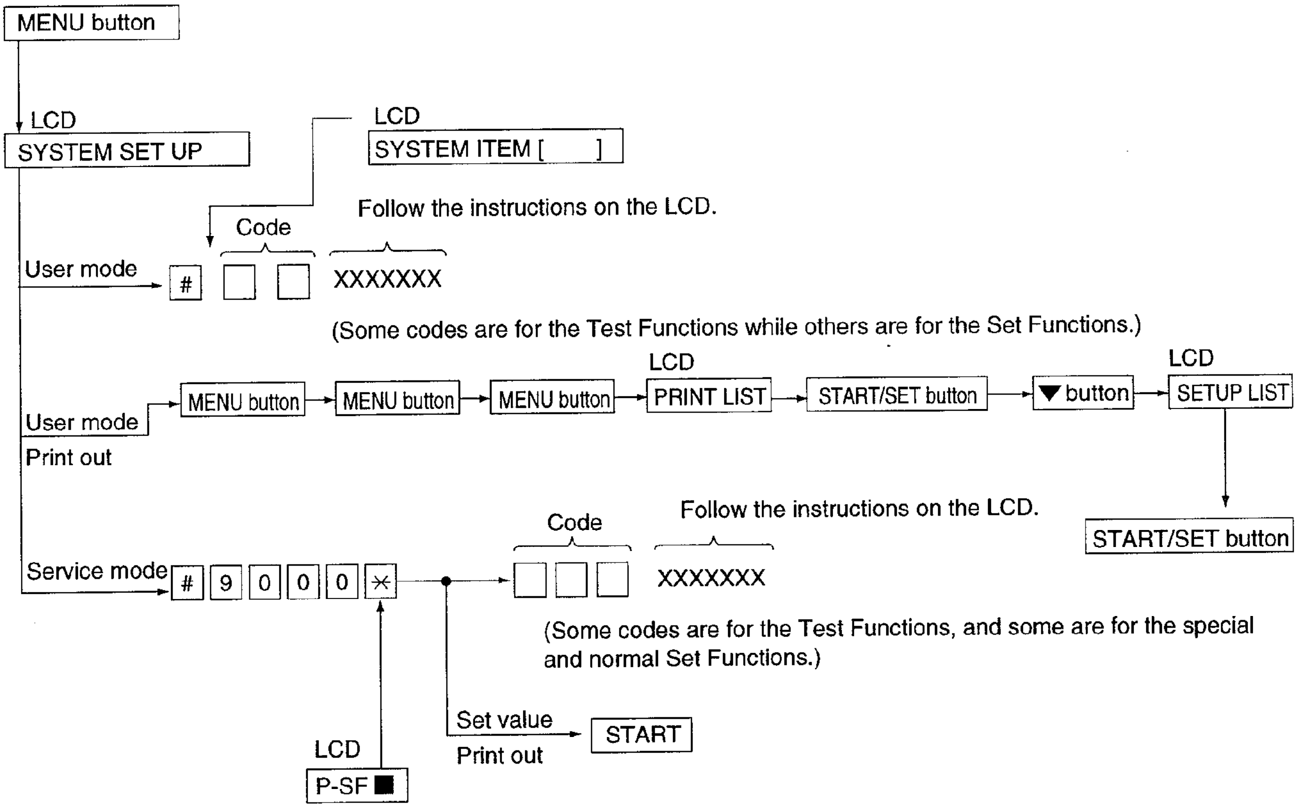
4.1 OPERATION

There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and available to the user. The special programs are those only listed here and not displayed to the user. In both the User and Service Modes, there are Set Functions and Test Functions. The Set Functions are used to program various features and functions, and the Test Functions are used to test various functions . The Set Functions are accessed by entering their code, changing the appropriate value, then pressing the SET key. The Test Functions are accessed by entering their code and pressing the key listed on the menu. While programming, to cancel any entry, press the STOP key.

4.2 OPERATION FLOW


Programming
User mode
(user programmable)
(1) Basic
(2) Advance
PRINT mode (Prints out a list to confirm the set values.)
Service mode
(non user programmable)
Normal
Special
(3) SET mode
(4) SET mode
(5) TEST mode
PRINT mode (Prints out a list to confirm the set values.)

Operating Procedure


MENU button
LCD
SYSTEM SET UP
LCD
SYSTEM ITEM [ ]
Follow the instructions on the LCD.
Code
User mode
# ☐ ☐ XXXXXXX
(Some codes are for the Test Functions while others are for the Set Functions.)
User mode
Print out
MENU button
MENU button
MENU button
LCD
PRINT LIST
START/SET button
▼ button
LCD
SETUP LIST
START/SET button
Code
Follow the instructions on the LCD.
Service mode
# 9 0 0 0 ✳
☐ ☐ ☐ XXXXXXX
(Some codes are for the Test Functions, and some are for the special and normal Set Functions.)
Set value
Print out
START
LCD
P-SF ■

4.3 USER MODE (The list below is an example of the SYSTEM SETUP LIST the unit prints out.)

SETUP LIST

```
[ BASIC FEATURE LIST ]

 NO.   FEATURE                            CURRENT SETTING
 #01   SET DATE & TIME                    Jan. 01 1998 12:06AM
/#02   YOUR LOGO
/ #03  YOUR FAX NUMBER
Code #04   PRINT SENDING REPORT           ERROR     [ERROR,ON,OFF]
 #06   TAD/FAX RING COUNT                 2         [1...4,TOLL SAVER,RINGER OFF]
 #10   RECORDING TIME                     VOX       [VOX,1MIN]
 #11   REMOTE TAD ID                 ID = 111
 #13   DIALING MODE                       AUTO      [AUTO,TONE,PULSE]
 #15   SEND BY MEMORY                     OFF       [ON,OFF]
                                            \
[ ADVANCED FEATURE LIST ]                    Set Value

 NO.   FEATURE                            CURRENT SETTING
 #22   JOURNAL AUTO PRINT                 ON        [ON,OFF]
/#23   OVERSEAS MODE                      OFF       [ON,OFF]
/ #25  DELAYED TRANSMISSION               OFF       [ON,OFF]
Code                       DESTINATION =
                            START TIME = 12:00AM
 #26   AUTO CALLER ID LIST                ON        [ON,OFF]
 #30   SILENT FAX RECOGNITION RING        3         [3...6]
 #31   RING DETECTION                     OFF       [OFF,A,B,C,D]
 #36   RECEIVE REDUCTION                   92%      [72,86,92,100]
 #39   LCD CONTRAST                       NORMAL    [NORMAL,DARKER]
 #41   FAX ACTIVATION CODE                ON        [ON,OFF]
                                  CODE = *9
 #42   MESSAGE ALERT                      OFF       [ON,OFF]
 #43   RECORDING TIME ALERT               OFF       [ON,OFF]
 #44   MEMORY RECEIVE ALERT               ON        [ON,OFF]
 #46   FRIENDLY RECEPTION                 ON        [ON,OFF]
 #47   FAX VOICE GUIDANCE                 ON        [ERROR,ON,OFF]
 #54   GREETING MSG. RECORDING TIME       16s       [16s,60s]
 NOTE : If you change from 60sec. to 16sec.
        your-greeting will be erased and your new greeting will be limited to 16 seconds.

 #60   MESSAGE TRANSFER                   OFF       [MESSAGE,PAGER,OFF]
                           DESTINATION =
 #61   TRANSFER GREETING                  CHECK     [CHECK,RECORD,ERASE]
 #67   ICM MONITOR                        ON        [ON,OFF]
 #70   FAX PAGER CALL                     OFF       [ON,OFF]
                           DESTINATION =
 #75   IQ-FAX                             OFF       [ON,OFF]
 #76   CONNECTING TONE                    ON        [ON,OFF]
 #77   AUTO ANSWER MODE                   TAD/FAX   [TAD/FAX,FAX ONLY,TEL/FAX]
 #78   TEL/FAX DELAYED RING               2         [1...4]
 #79   FILM DETECTION                     ON        [ON,OFF]
 #80   SET DEFAULT                          \
                                          Set Value

    IF YOU HAVE A PROBLEM WITH YOUR FAX MACHINE, CALL TOLL-FREE 1-800-HELP-FAX (1-800-435-7329)
```

Note:

The above values are the default values.

4.4 SERVICE FUNCTION TABLE

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time set	X 100 msec	001~600	050	
502	Flash time set	X 10 msec	01~99	70	
503	Dial speed select	1:10 pps 2:20 pps	1, 2	1	
510	VOX TIME	1:6 sec 2:4 sec	1, 2	1	
520	CED frequency select	1:2100 Hz 2:1100 Hz	1, 2	1	See page 52.
521	International mode select	1:ON 2:OFF	1, 2	1	See page 52.
522	Auto standby select	1:ON 2:OFF	1, 2	1	The resolution reverts to the default when transmission is complete.
523	Receive equalizer select	1:0 km 2:1.8 km 3:3.6 km 4:7.2 km	1~4	1	Set RX equalizer to automatical mode.
524	Transmission equalizer select	1:0 km 2:1.8 km 3:3.6 km 4:7.2 km	1~4	1	
533	Setting the number of times that massage transfer is redialed.	00~99	00~99	030	Selects the number of times that message transfer is redialed (not including the first dialing).
534	Setting the message transfer/pager call redial interval	001~999 sec	001~999	030	Sets the interval of message transfer/pager call redial.
550	Memory clear: To reset the value to the default one, except the top margin (853) and left margin (854).				"START" input
551	ROM check				"START" input
552	DTMF single tone test	1:ON 2:OFF	1, 2	2	See page 105.
553	Monitor on FAX communication select	1: OFF 2:PHASE B 3:ALL	1~3	1	
554	Modem test				See page 105.
555	Scan check				See page 105.
556	Motor test			00	See page 105.
557	LED test				See page 105.
558	LCD test				See page 105.
559	Document jam detection select	1:ON 2:OFF	1, 2	1	See page 28.
561	KEY test				See page 105.
563	Scanner position adjustment value set	X 1 mm	00~30	-----	See page 119.

Code	Function	Set Value	Effective Range	Default	Remarks
570	BREAK % select	1:61% 2:67%	1, 2	1	
571	ITS auto redial time set	X number of times	00~99	14	
572	ITS auto redial line disconnection time set	X second	001~999	030	
573	Remote turn-on ring number set	X number of rings	01~99	15	
580	TAM continuous tone detection	1:ON 2:OFF	1, 2	1	
590	FAX auto redial time set	X number of times	00~99	005	
591	FAX auto redial time disconnection time set	X second	001~999	045	
592	CNG transmit select	1: OFF 2:ALL 3:AUTO	1~3	2	
593	Time between CED and 300bps	1: 75 msec 2:500 msec 3:1 sec	1~3	1	See page 52.
594	Overseas DIS detection select	1:detects at the 1st time 2:detects at the 2st time	1, 2	1	See page 52.
595	Receive error limit value set	X Number of times	001~999	100	If the number of errors during transmission exceeds this value, the sending side terminates the call.
596	Transmit level set	X dBm	- 15~00	10	Values entered without a "minus sing" will be regarded as negative.
598	Receiving sensitivity	43= -43 dBm	20~48	41	Used when there is an error problem. If set to 41, the vaule will become -43dBm on the hardware side.
599	ECM Frame size	1: 256 byte 2:64 byte	1, 2	1	Used during ECM communication.
602	Warning LIST Printing	1:ON 2:OFF	1, 2	1	Used to print a caution list when setting the TEL/FAX mode and ring detection.
717	Transmit speed selection	1:14400BPS 2:12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Sets fall back speed in the transmitting mode.(See page 52.)
718	Receive speed selection	1:14400BPS 2:12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Sets fall back speed in the receiving mode.(See page 52.)
719	Ringer off in TEL/FAX mode	1:ON 2:OFF	1, 2	1	Selects whether the ring is on or off when the unit receives an incoming signal in the TEL/FAX mode when the ringer.
721	Pause tone detect	1:ON 2:OFF	1, 2	1	Sets the tone detection mode in pause.
722	Redial tone detect	1:ON 2:OFF	1, 2	1	Sets the tone detection mode after redialing.

Code	Function	Set Value	Effective Range	Default	Remarks
731	CPC mode	1:A 2:B 3:OFF	1~3	1	Sets the CPC signal detection mode from the converter
732	AUTO disconnect cancel time	1:350 ms 2:1.8 sec 3:OFF	1~3	1	Sets to "2" when the auto disconnect circuit operates and cuts the line.
745	Poewr ON film feed	1:ON 2:OFF	1, 2	1	When the power is turned on, the film is wound to take up any slack.
763	CNG detect time for friendly reception	1:10 sec 2:20 sec 3:30 sec	1~3	3	The period during which CNG is deteced during friendly reception.
771	T1 timer	1:35 sec 2:60 sec	1, 2	1	Sets the time out.
775	Monitoring of message transfer	1:ON 2:OFF	1, 2	2	If set to ON a message can be monitored from this unit's SP-PHONE when transferring a message.
784	Voice prompt test				see page 75.
815	Sensor & Vox check				See page 106.
841	Digital SP-phone check				See page 82.
852	Print test pattern				See page 105.
853	Top margin		1~9	--------	
854	Left margin		1~8	--------	
861	A4 size set	1:ON 2:OFF	1, 2	2	Used only at the factory.
880	History list				See page 98.
881	Journal 2 list				See page 103.
882	Journal 3 list				See page 104.
890	TEL/FAX 1st ring back tone	1:ON 2:OFF	1, 2	1	Selects whether the TEL/FAX 1st ring back tone is ON or OFF in the TEL/FAX mode.

4.5 SERVICE MODE SETTINGS (Example of a printed out list)

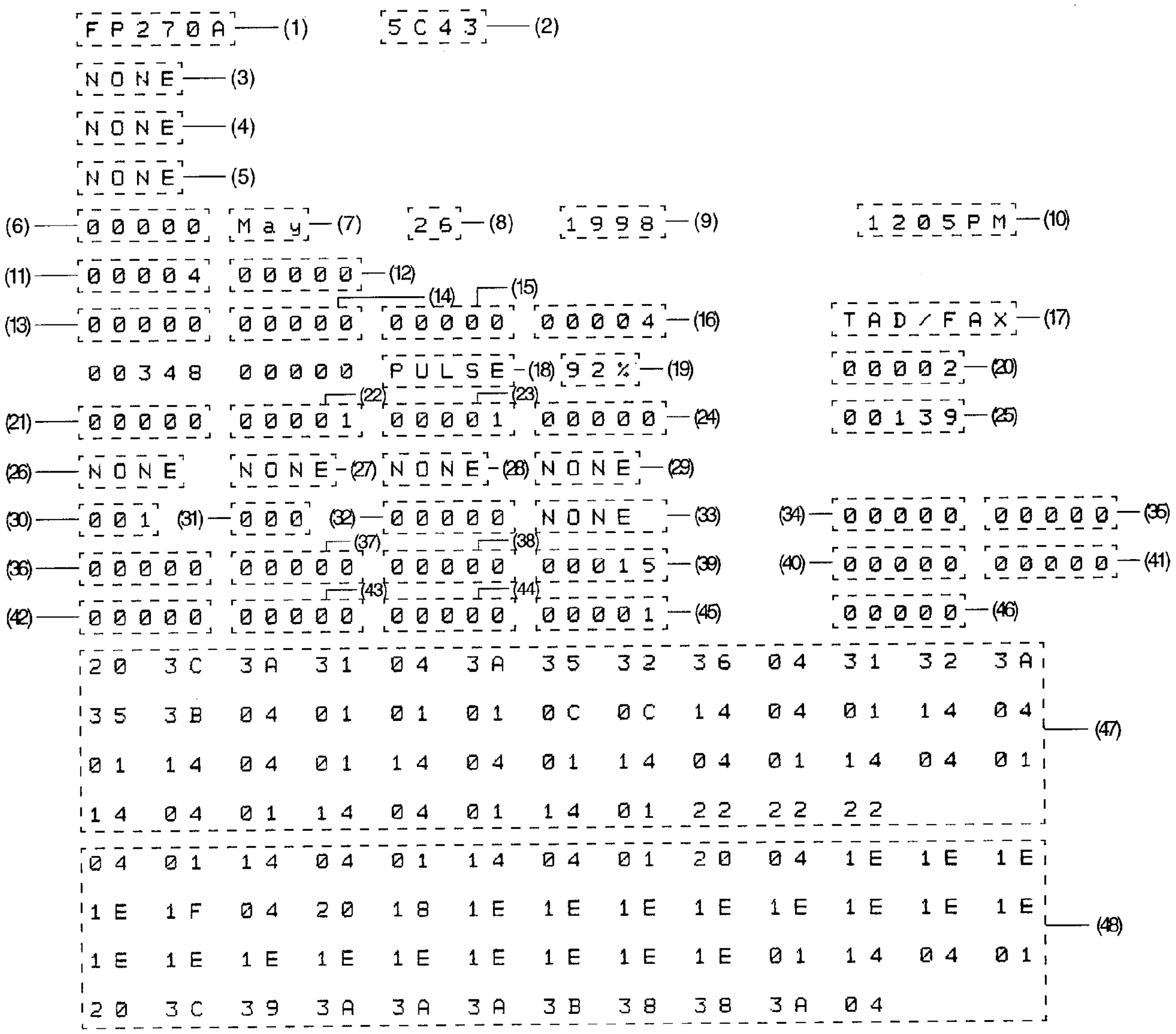
```
[ SERVICE DATA LIST ]
     Code                                  Set Value
501 PAUSE TIME         =  050*100ms        [001...600]*100ms
502 FLASH TIME         =  70*10ms          [01...99]*10ms
503 DIAL SPEED         =  10pps            [1=10     2=20]pps
510 VOX TIME           =  6sec             [1=6      2=4]sec
520 CED FREQ.          =  2100Hz           [1=2100   2=1100]Hz
521 INTL. MODE         =  ON               [1=ON     2=OFF]
522 AUTO STANDBY       =  ON               [1=ON     2=OFF]
523 RX EQL.            =  0.0Km            [1=0.0    2=1.8    3=3.6    4=7.2]Km
524 TX EQL.            =  0.0Km            [1=0.0    2=1.8    3=3.6    4=7.2]Km
853 TOP MARGIN         =  5                [1...9]
854 LEFT MARGIN        =  5                [1...8]
```

```
[ SPECIAL SERVICE SETTINGS ]

      533   534   552   553   559   563   570   571   572   573   580   590   591
       03   030     2     1     1    15     1    14   030    15     1    05   045
              Set Value
Code  592   593   594   595   596   598   602   717   718   719   721   722   731
        2     1     1   100    10    41     1     1     1     1     1     1     1

      732   745   763   771   775   861   890
        1     1     3     1     2     2     1

USAGE TIME = 00000 HOURS
```

Note:

The above values are the default values.

```
【 HISTORY 】
```



```
FP270A —(1)        5C43 —(2)
NONE —(3)
NONE —(4)
NONE —(5)
(6)— 00000  May —(7)  26 —(8)  1998 —(9)            1205PM —(10)
(11)— 00004  00000 —(12)
                    (14)  (15)
(13)— 00000  00000  00000  00004 —(16)             TAD/FAX —(17)
      00348  00000  PULSE -(18) 92% —(19)          00002 —(20)
                  (22)      (23)
(21)— 00000  00001  00001  00000 —(24)             00139 —(25)
(26)— NONE   NONE -(27) NONE -(28) NONE —(29)
(30)— 001 (31)— 000 (32)— 00000  NONE —(33)   (34)— 00000  00000 —(35)
                  (37)      (38)
(36)— 00000  00000  00000  00015 —(39)        (40)— 00000  00000 —(41)
                  (43)      (44)
(42)— 00000  00000  00000  00001 —(45)             00000 —(46)

 20 3C 3A 31 04 3A 35 32 36 04 31 32 3A
 35 3B 04 01 01 01 0C 0C 14 04 01 14 04 —(47)
 01 14 04 01 14 04 01 14 04 01 14 04 01
 14 04 01 14 04 01 14 01 22 22 22

 04 01 14 04 01 14 04 01 20 04 1E 1E 1E
 1E 1F 04 20 18 1E 1E 1E 1E 1E 1E 1E 1E —(48)
 1E 1E 1E 1E 1E 1E 1E 1E 1E 01 14 04 01
 20 3C 39 3A 3A 3A 3B 38 38 3A 04

NAME ____________ DATE ____________ DEALER ____________ FILM ____________
CUSTOMER COMPLAINT
______________________________________________________________
SURVEY RESULT : CKOK (UNKNOWN/DESIGN/EDUC)   DEFECT (PART/WORKER/DESIGN)
ABUSE (CUST/DEALER/SHIP)   NEW (OPEN/NOT)
PHONE SURVEY RESULT.
```

Note: See the next page for an explanation of this report.

Descriptions of individual items on the previous page.

(1) **ROM VERSION**
EPROM version

(2) **SUM**
EPROM internal data calculation.

(3) **YOUR LOGO**
The recorded LOGO in the unit. If it is not recorded, NONE will be displayed.

(4) **YOUR TELEPHONE NUMBER**
The recorded user telephone number in the unit. If it is not recorded, NONE will be displayed.

(5) **FAX PAGER NUMBER**
If you program a pager number into the unit, the pager number will be displayed here.

(6) **FACTORY - CUSTOMER**
This shows how many days from factory production until the user turns ON the unit.

(7) **MONTH**
(8) **DAY**
(9) **YEAR**
(10) **TIME**
The shows the very first month, date, year and time set by the user after they purchased the unit.

(11) **USAGE TIME**
The amount of time the unit has been powered ON.

(12) **FACTORY - NOW**
This shows how many days from factory production until the user prints out this history list.

(13) **TEL MODE**
The amount of time the TEL mode setting was used.

(14) **FAX MODE**
The amount of time the FAX mode setting was used.

(15) **TEL/FAX MODE**
The amount of time the TEL/FAX mode setting was used.

(16) **ANS/FAX MODE**
The amount of time the ANS/FAX mode setting was used.

(17) **FINAL RECEIVE MODE**
The last set receiving mode by the user.

(18) **TONE/PULSE SELECTION**
The most recently used setting used, either TONE or PULSE.

(19) **RECEIVE REDUCTION**
The compression rate when receiving.

(20) **SETTING NO. OF DIRECTORY**
The recorded directory stations (one touch and JOG DIAL).

(21) **NUMBER OF COPY**
The number of pages copied.

(22) **NUMBER OF RECEIVE**
The number of pages received.

(23) **NUMBER OF SENDING**
The number of pages sent.

(24) **NUMBER OF CALLER ID**
The number of times Caller ID was received.

(25) **NUMBER OF RECORDING MESSAGE**
The number of messages recorded in TAM.

(26) **NUMBER OF PC SCAN**
The number of times multifunction was used for the Scanner. (The number of pages scanned. If the unit does not have a PC interface, NONE will be printed.)

(27) **NUMBER OF PC-PRINT**
The number of times multifunction was used for the Printer. (The number of pages printed. If the unit does not have a PC interface, NONE will be printed.)

(28) **NUMBER OF RECEIVING TO PC**
The number of times received in the PC through the FAX serial interface (RS232C). (The number of pages received. If the unit does not have a PC interface, NONE will be printed.)

(29) **NUMBER OF SENDING FROM PC**
The number of times transmitted from the PC through the FAX serial interface (RS232C). (The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)

(30) **NUMBER OF PRINTING WARNING LIST**
The number of warning lists printed until now.

(31) **NUMBER OF PRINTING HELP**
The number of help lists printed until now.

(32) **NUMBER OF DIVIDED PRINTING IN FAX RECEPTION**
The number of faxes received that were divided into more than one sheet since the unit was purchased.

(33) **DETECTION OF RS232C**
When the fax and PC serial cable (RS232C) are connected and the signal is received correctly, COMPLETE will be printed. For models without a PC interface or when there is a PC interface but the signal cannot be received between the fax and PC, INCOMPLETE will be printed.
(The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)

(34) **NO. OF IQ FAX LOADING -OK**
(35) **NO. OF IQ FAX LOADING -NG**
You may not be able to use IQ-FAX if the special subscriber information is not loaded from the IQ-FAX center before use. Depending on the conditions of the communication line, it may not be completed in one time, so retried will be performed. The number of times there was an OK and NG are printed.

(36) **FAX MODE**
Means the unit received a fax message in the FAX mode.

(37) **MAN RCV**
Means the unit received a fax message by manual operation.

(38) **FRN RCV**
Means the unit received a fax message by friendly signal detection.

(39) **VOX**
Means the unit detected silence or no voice.

(40) **RMT DTMF**
Means the unit detected DTMF (Remote Fax activation code) entered remotely.

(41) **PAL DTMF**
Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.

(42) **TURN-ON**
Means the unit started to receive after 15 rings.
(Remote Turn On: Service Code #573)

(43) **TIME OUT**
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.

(44) **IDENT**
Means the unit detected Ring Detection.

(45) **CNG OGM**
Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode, or while answering a call in the EXT-TAM mode.
OR
Means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.

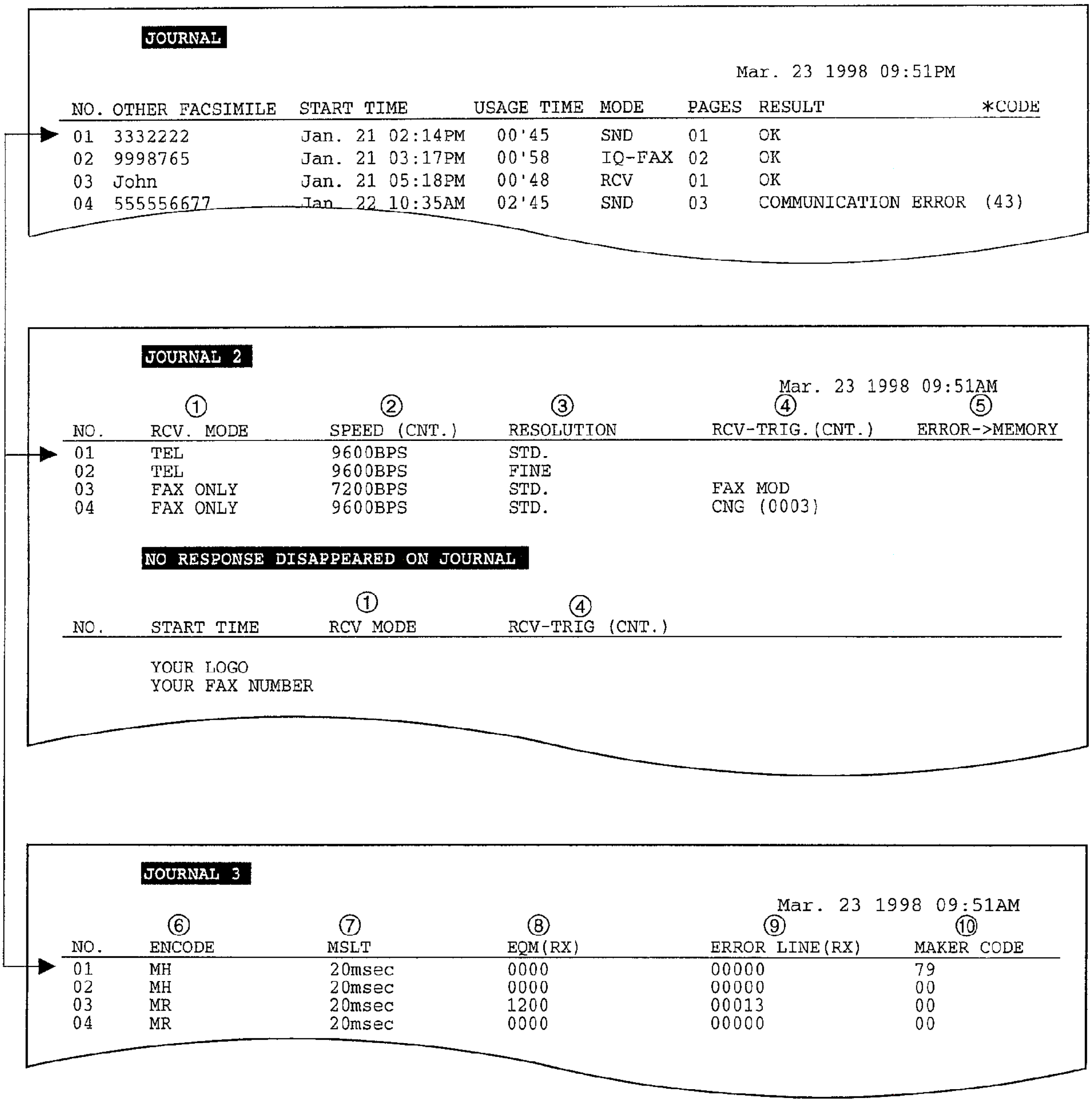
(46) **CNG ICM**
Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.

(47) **KEY OPERATION -1st 50**
(48) **KEY OPERATION -Last 50**
Indicates 2-digit codes. Refer to "5.2 BUTTON CODE TABLE" on page 106.

- 1st 50: History of the first 50 key operations after purchase.
  (Ex.) If 20, 3C and 39 are printed, then the MENU, # and 9 buttons were pressed.
- Last 50:History of the last 50 key operations.

4.7 SPECIAL SERVICE JOURNAL REPORTS

Journal 2 or Journal 3 shown below, which are special journals giving additional detailed information about the latest 35 communications, can be printed using service code 881 or 882. They can also be printed out remotely (with the existing journal). [Refer to page 62.] Journal 2 and Journal 3's data are related.



```
JOURNAL
                                                           Mar. 23 1998 09:51PM
NO. OTHER FACSIMILE   START TIME        USAGE TIME  MODE     PAGES  RESULT                 *CODE
01  3332222           Jan. 21 02:14PM    00'45      SND       01    OK
02  9998765           Jan. 21 03:17PM    00'58      IQ-FAX   02     OK
03  John              Jan. 21 05:18PM    00'48      RCV       01    OK
04  555556677         Jan. 22 10:35AM    02'45      SND       03    COMMUNICATION ERROR  (43)
```

```
JOURNAL 2
                                                               Mar. 23 1998 09:51AM
         ①                   ②                 ③                       ④               ⑤
NO.      RCV. MODE           SPEED (CNT.)      RESOLUTION              RCV-TRIG.(CNT.)  ERROR->MEMORY
01       TEL                 9600BPS           STD.
02       TEL                 9600BPS           FINE
03       FAX ONLY            7200BPS           STD.                    FAX MOD
04       FAX ONLY            9600BPS           STD.                    CNG (0003)

NO RESPONSE DISAPPEARED ON JOURNAL
                             ①                 ④
NO.      START TIME          RCV MODE          RCV-TRIG (CNT.)

         YOUR LOGO
         YOUR FAX NUMBER
```

```
JOURNAL 3
                                                               Mar. 23 1998 09:51AM
         ⑥                   ⑦                 ⑧                       ⑨               ⑩
NO.      ENCODE              MSLT              EQM(RX)                 ERROR LINE(RX)   MAKER CODE
01       MH                  20msec            0000                    00000            79
02       MH                  20msec            0000                    00000            00
03       MR                  20msec            1200                    00013            00
04       MR                  20msec            0000                    00000            00
```

For example, the 1st communication in the Journal above is a Fax transmission in the Tel mode, at 9.6 kbps TX speed, the resolution is standard, a MH code is used, and the Maker code is 79.
The 2nd one is IQ–Fax in Tel mode, and the resolution is fine etc.

CNG (0003) means the 3rd time a CNG signal was received for Fax Rx from purchasing the unit until now.
Jouranl 2 and Journal 3 are explained on the next page.

4.7.1 JOURNAL 2

Journal 2 displays the additional detailed information about the last 35 communications.

Description of individual items from the previous page.

① **RCV. MODE**
Indicates which receive mode the unit was in when the unit received a fax message.
This information is also displayed when the unit transmitted a fax message.

② **SPEED**
Indicates the speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. If there is a communication error, "?" is displayed.

③ **RESOLUTION**
Indicates the resolution of the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. If there is a communication error, "?" is displayed.

④ **RX-TRIG. (CNT.)**
Indicates the trigger that causes the unit to switch to the fax receive mode. The available options are listed in the below (Refer to page 100.) The values in parentheses indicate how many times the trigger has been used. (For example, "00003" means three times.)

⑤ **ERROR→MEMORY**
Indicates the reason why the unit received a fax message in memory.
In the printing example on the next page, a "paper out" error occurred and direct reception to fax memory took place.

NO RESPONSE DISAPPEARED ON JOURNAL

The NO RESPONSE DISAPPEARED ON JOURNAL displays the information about the last 10 communications terminated with No Response. (Some of the communications terminated by No Response were not displayed in the JOURNAL.)
When fax transmission cannot be performed because the ohter party's unit is set to the TEL mode, " No response" will be printed.

4.7.2 JOURNAL 3

Description of individual items.

⑥ **ENCODE**
Compression Code : MH/MR

⑦ **MSLT**
MSLT means Minimum Scan Line Time.
Use only at the factory.

⑧ **EQM**
EQM means Eye Quality Monitor.
Use only at the factory.

⑨ **ERROR LINE(RX)**
When an error occurs while receiving a fax, this shows the number of lines received.

⑩ **MAKER CODE**
This shows a 2 digit code of the other party's fax machine brand.

0E:	"KX" model
00:	Unknown
79:	"UF" model
19:	"Zerox" model

4.7.3 PRINTOUT EXAMPLE

JOURNAL 2

```
                                                                     Mar. 25 1998 01:59PM

 NO.   RCV. MODE         SPEED   (CNT.)   RESOLUTION      RCV-TRIG.(CNT.)   ERROR->MEMORY
 01    FAX ONLY          9600BPS          FINE.           FAX MOD
 02    FAX ONLY          9600BPS          STD.            FAX MOD
 03    FAX ONLY          9600BPS          FINE.
 04    FAX ONLY          9600BPS          FINE.           FAX MOD
 05    FAX ONLY          9600BPS          FINE.           FAX MOD
 06    FAX ONLY          9600BPS          FINE.           FAX MOD
 07    FAX ONLY          9600BPS          FINE.
 08    FAX ONLY          9600BPS          FINE.
 09    FAX ONLY          9600BPS          FINE.
 10    FAX ONLY          9600BPS          STD.            FAX MOD
 11    FAX ONLY          9600BPS          FINE.           FAX MOD           PAPER OUT
 12    FAX ONLY          9600BPS          STD.            FAX MOD
 13    FAX ONLY          9600BPS          STD.
 14    FAX ONLY          ?                ?
 15    FAX ONLY          ?                ?
 16    FAX ONLY          ?                ?
 17    FAX ONLY          9600BPS          STD.
 18    FAX ONLY          9600BPS          FINE.           FAX MOD
 19    FAX ONLY          9600BPS          STD.            FAX MOD
 20    FAX ONLY          9600BPS          S-FINE.
 21    FAX ONLY          9600BPS          FINE.
 22    FAX ONLY          9600BPS          FINE.           FAX MOD
 23    FAX ONLY          ?                ?               FAX MOD
 24    FAX ONLY          9600BPS          STD.            FAX MOD
 25    FAX ONLY          9600BPS          STD.            FAX MOD
 26    FAX ONLY          9600BPS          FINE.           FAX MOD
 27    FAX ONLY          9600BPS          FINE.
 28    FAX ONLY          9600BPS          STD.            FAX MOD
 29    FAX ONLY          9600BPS          FINE.           FAX MOD
 30    FAX ONLY          9600BPS          S-FINE.         FAX MOD
 31    FAX ONLY          9600BPS          STD.            FAX MOD
 32    FAX ONLY          9600BPS          STD.            FAX MOD
 33    FAX ONLY          ?                ?               FAX MOD
 34    FAX ONLY          9600BPS          STD.            FAX MOD
 35    FAX ONLY          9600BPS          STD.            FAX MOD
```

NO RESPONSE DISAPPEARED ON JOURNAL

```
 NO.   START TIME        RCV MODE         RCV-TRIG.(CNT.)

         YOUR LOGO
         YOUR FAX NUMBER
```

JOURNAL 3

```
                                                                  Mar. 25 1998 01:58PM

NO.    ENCODE        MSLT          EQM(RX)         ERROR LINE(RX)    MAKER CODE
01     MR            10msec        007A            00000             0E
02     MR            20msec        016B            00000             00
03     MH            10msec        0000            00000             00
04     MR            20msec        019B            00003             00
05     MR            20msec        0156            00011             00
06     MR            20msec        0113            00000             00
07     MR             5msec        0000            00000             79
08     MR             5msec        0000            00000             79
09     MR             0msec        0000            00000             19
10     MR            20msec        0100            00000             00
11     MR            10msec        0073            00000             0E
12     MR            20msec        012B            00000             00
13     MH            20msec        0000            00000             79
14     MH            20msec        0000            00000             00
15     MH            20msec        0000            00000             00
16     MH            20msec        0000            00000             00
17     MR             5msec        0000            00000             79
18     MR            10msec        00AB            00004             0E
19     MR            20msec        0124            00000             00
20     MR            20msec        0000            00000             00
21     MR            20msec        0000            00000             00
22     MR            20msec        0135            00000             00
23     MR            20msec        0000            00000             00
24     MR            20msec        01BC            00000             00
25     MR            20msec        01AC            00000             00
26     MR            20msec        020F            00000             00
27     MR            10msec        0000            00000             0E
28     MR            20msec        01DF            00000             00
29     MR            20msec        01EA            00000             00
30     MR            20msec        00CD            00000             00
31     MR            20msec        02F8            00000             0E
32     MR            10msec        04F8            00000             0E
33     MR            10msec        0000            00000             00
34     MR            20msec        03B6            00000             0E
35     MH            20msec        00E0            00000             00
```

5. TEST FUNCTIONS

The codes listed below can be used to perform simple checks of some of the unit's functions. When complaints are received from customers, they provide an effective tool for identifying the locations and causes of malfunctions.

Test mode	Type of Mode	Code □□□	Function
		Operation after code input	
MOTOR TEST	Service Mode	5 5 6	Rotates the transmission and reception motors to check the operation of the motors. 00 ... Stop 10 ... FF RX motor --- Copy/List/Fax RX printing and print out 20 ... FF RX motor --- Copy/List/Fax RX printing and print out (When all white lines are read.) 01 ... FF TX motor --- Copy/TX reading 02 ... FF TX motor --- Document print out 03 ... Backward TX motor --- Factory use only 04 ... Backward TX motor --- Recording Paper is fed. **Note** : You can perform two tests at the same time. Ex. if you enter "14", the tests for "10" and "04" will be performed at the same time. When feeding the recording paper, the ink film should be inserted. • Press the STOP button to quit.
		START	
MODEM TEST	Service Mode	5 5 4	First, go OFF-HOOK with the handset to enter this Test Mode. Each time you press the start key, each of the signals will be heard in the following order from the handset. 1) OFF → 2) 14400bps → 3) 12000bps → 4) 9600bps (V17) → 5) 7200bps (V17) → 6) 9600bps → 7) 7200bps → 8) 4800bps → 9) 2400bps → 10) 300bps →11) 2100Hz →12) 1100Hz
		START	
ROM CHECK	Service Mode	5 5 1	Indicates the version and check sum of the ROM.
		START	
SCAN CHECK	Service Mode	5 5 5	Turns on the LEDs of the CCD unit and operates the read system. This is also used to adjust the CCD. (Refer to page 114.)
		START	
LCD CHECK	Service Mode	5 5 8	Checks the LCD indication. Illuminates all the dots to check if they are normal.
		START	
DTMF SINGLE TEST	Service Mode	5 5 2	Outputs DTMF as single tones. Used to check the frequencies of the individual DTMF tones. Refer to "5.1 DTMF Single Tone Transmit Select" on page 106.
		1..On 2..Off	
LED TEST	Service Mode	5 5 7	All LEDs above the operation panel board flash on and off, or are illuminated.
		START	
KEY CHECK	Service Mode	5 6 1	Checks the button operation. Indicates the button code on the LCD while the button is pressed. Refer to "5.2 Button Code Table" on page 106.
		START {any key}	
FACTORY SET	Service Mode	5 5 0	Clears the memory where the user can store data.
		START	
CCD AUTO POSITION ADJUSTMENT	Service Mode	5 6 4	Used only at the factory.
		START	
PRINT TEST PATTERN	Service Mode	8 5 2	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~4. (See pages 107~110.)
		START	
DIGITAL SPEAKERPHONE RX & TX CHECK	Service Mode	8 4 1	Please refer to page 82.
		SPEAKERPHONE	

Test mode	Type of Mode	● Code □□□ ● Operation after code input.	Function
SENSOR CHECK & VOX CHECK	Service Mode	8 1 5 START LCD display Do Sn Co Pl Pt Ri Vx	After entering this mode, by operating the sensor levers, etc, using your hands, each sensor and SW display above the LCD will go ON/OFF. Also, when copying a document, the related sensor will turn ON/OFF. (Do, Sn, Pl, Pt, Ri) For each sensor's operation, refer to page 157.
		Do: Document set sensor:	Paper inserted. Turns on when a document is inserted.
		Sn: Read position sensor:	At the read position. Turns on when the front cover is opened and the sensor lever is pressed directly.
		Co: Cover open sensor:	Cover open. Turns on and off when the front cover is opened and closed.
		Pl: Paper set switch:	Sensor on. Turns on and off when the cassette lock lever is pushed down and up.
		Pt: Paper top sensor:	Sensor on. Turns on when the front cover is opened and the sensor lever is pressed directly.
		Ri: Film and sensor:	Sensor on. Turns on and off when the film end sensor gear is turned.
		Vx: Vox signal:	Detection signal for the tone on the line. If there is a tone, it is ON.

Note: The numbers in the boxes (XXX) indicate the keys to be input for the various test modes.

5.1 DTMF SIGNAL TONE TRANSMIT SELECTION

When set to ON (=1), the 12 keys and transmission frequencies are as shown.

key	High Frequency (Hz)	Key	Low Frequency (Hz)
"1"	697	"5"	1209
"2"	770	"6"	1336
"3"	852	"7"	1477
"4"	941	"8"	1633

When set to OFF (=2), the 12 keys and transmission frequencies are as shown.

High (Hz) Low (Hz)	1209	1336	1477
697	"1"	"2"	"3"
770	"4"	"5"	"6"
852	"7"	"8"	"9"
941	✳	"0"	"#"

Note: After performing this check, do not forget to turn the setting off.
Otherwise, dialing using DTMF will not be possible.

5.2 BUTTON CODE TABLE

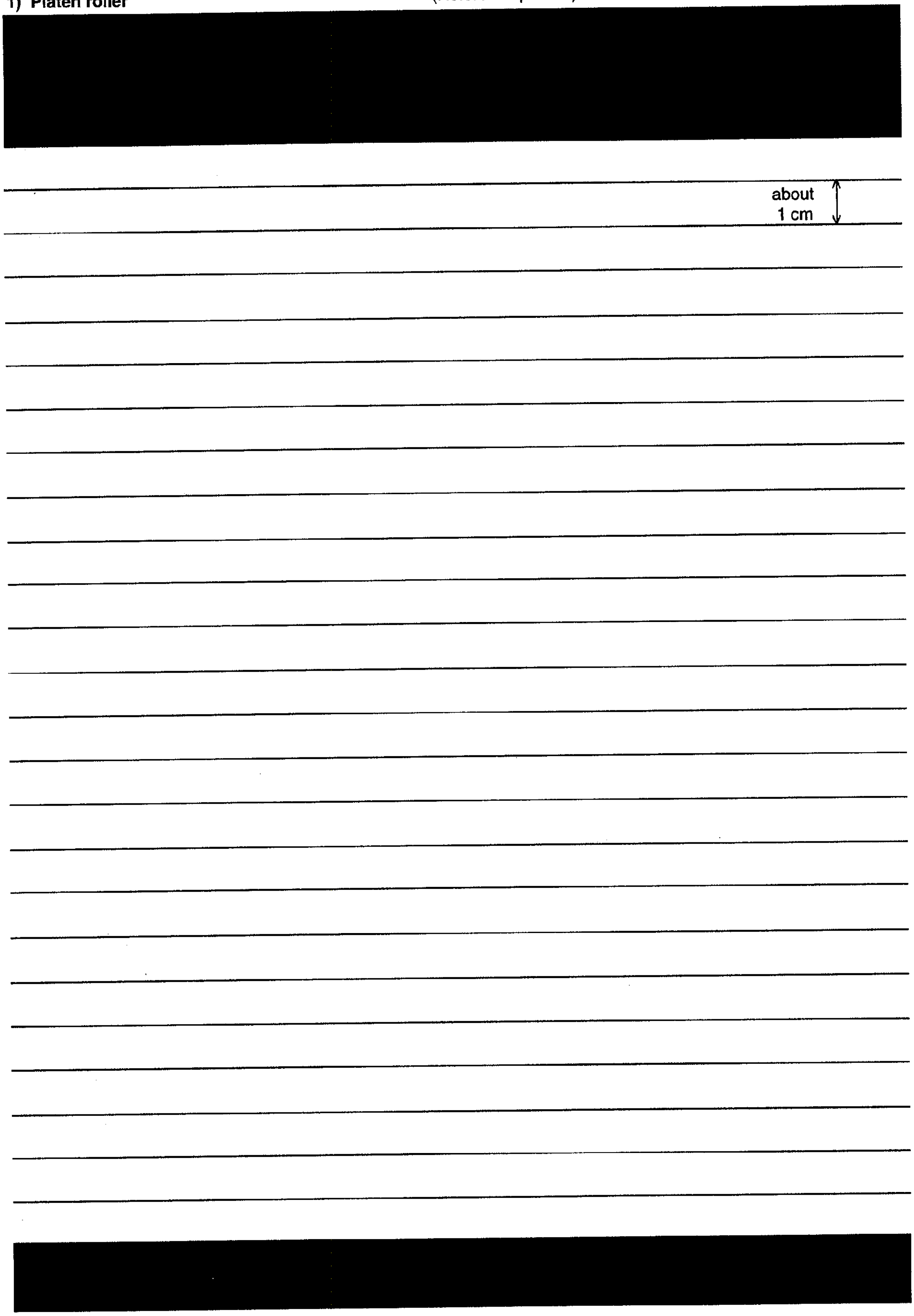
Code	Button Name	Code	Button Name	Code	Button Name
02	RESOLUTION	31	1	3D	REDIAL/PAUSE
04	START/COPY/SET	32	2	3E	FLASH
05	LOWER	33	3	48	IQ-FAX
07	FILM REMAINING	34	4	64	STATION 1
08	SP-PHONE	35	5	65	STATION 2
0A	MUTE	36	6	66	STATION 3
0C	RECEIVE MODE	37	7	67	STATION 4
20	MENU	38	8	68	STATION 5
22	HELP	39	9	1E	JOG (RIGHT)
24	DIRECTORY	3A	0	1F	JOG (LEFT)
25	▲ VOLUME	3B	✳	00	NO INPUT
26	▼ VOLUME	3C	#	01	STOP

Note: These codes (00, 01) are only for the data in the History Report.

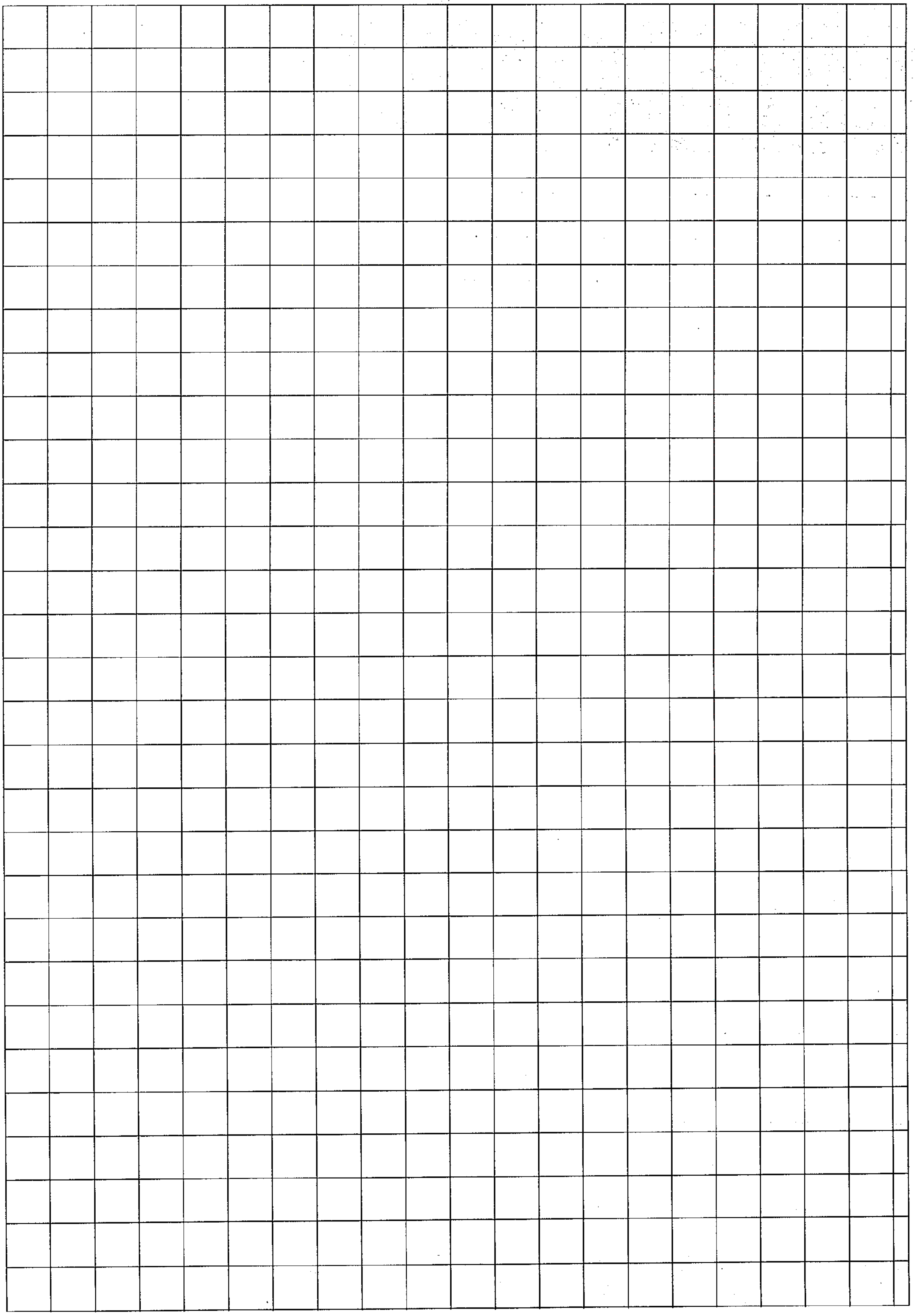
5.3 PRINT TEST PATTERN

1) Platen roller

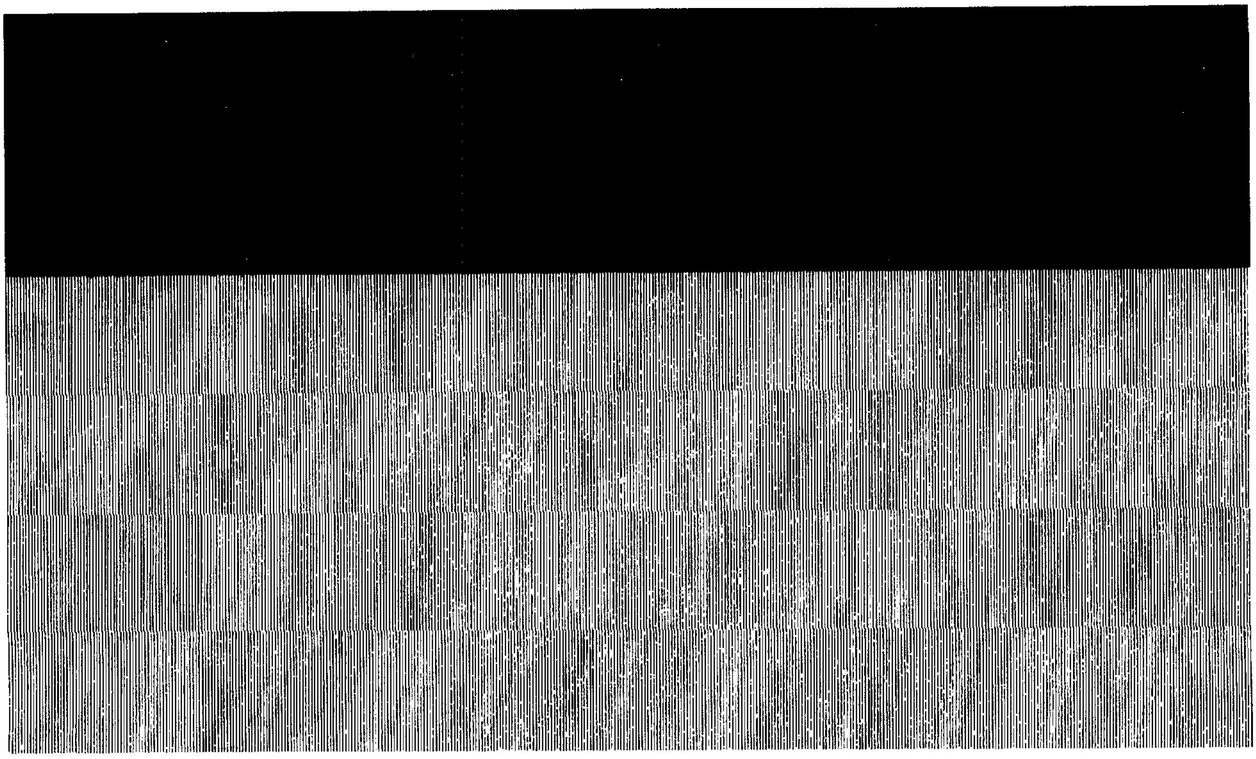
(Reference pattern)



2) Left margin/Top margin (Reference pattern)

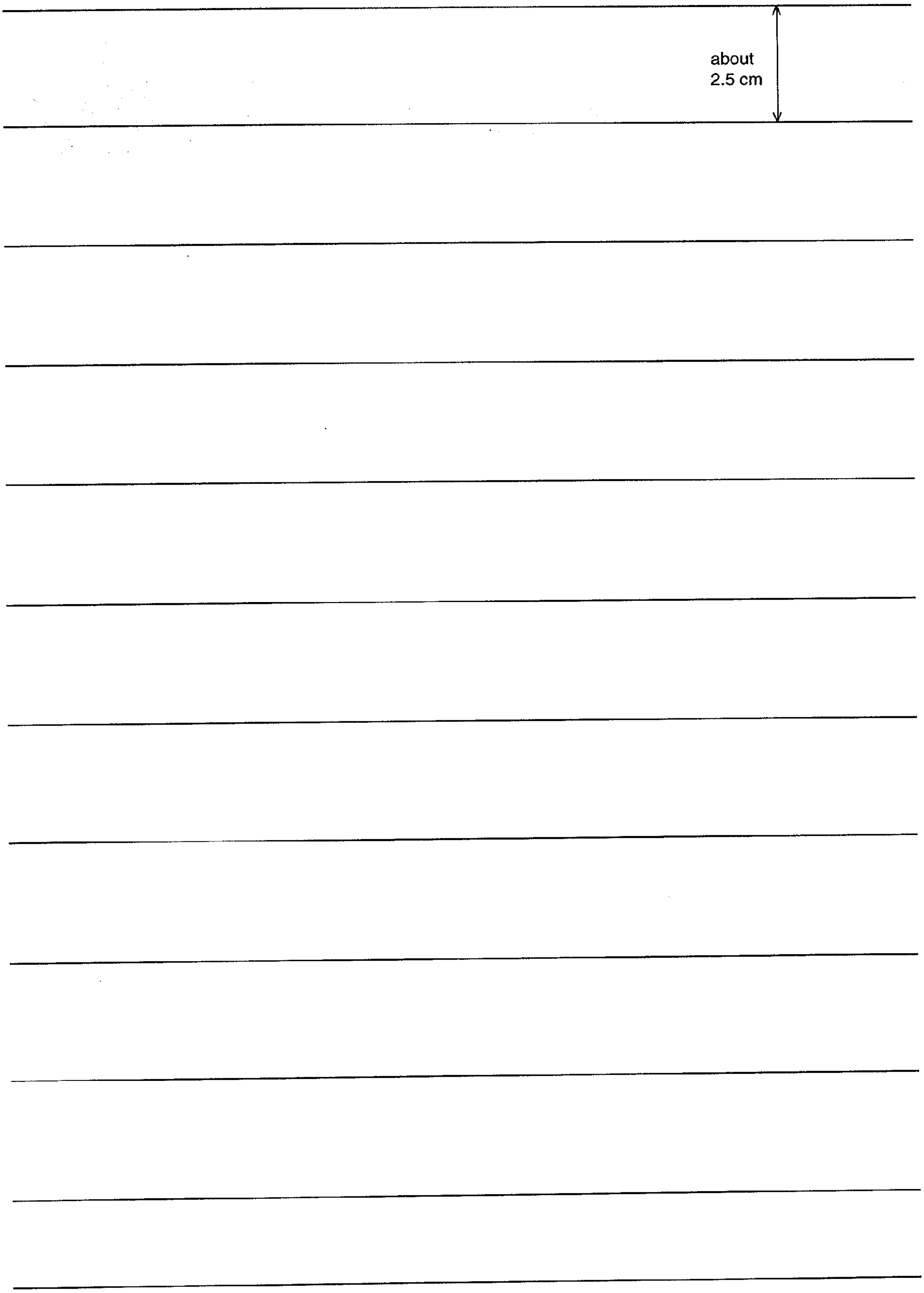


3) Thermal head 1 dot (Reference pattern)



4) **Use this test pattern to confirm the torque limiter for Ink film and platen roller timing.**

(Reference pattern)



MEMO

ADJUSTMENTS

Page

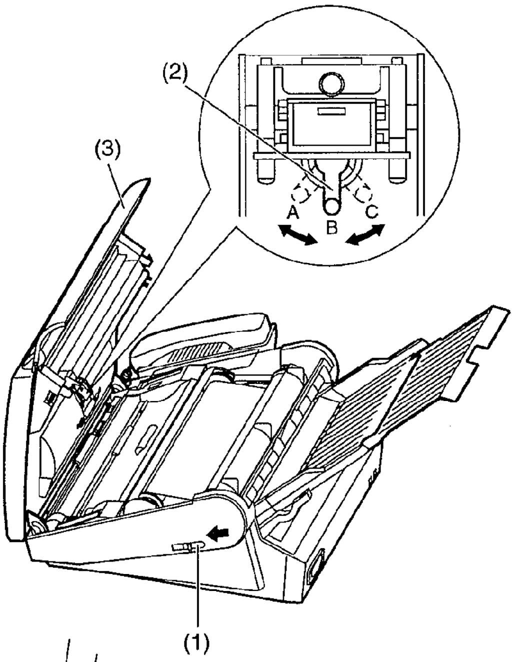
1. Table of Test Equipment and Tools 113
2. Adjusting the Feeder Pressure 113
3. Confirming the Separation Spring 113
4. CCD Adjustments .... 114~117
5. Document Read Start Position Adjustment 119

1. TABLE OF TEST EQUIPMENT AND TOOLS

No.	Test Equipment and Jig Name	Jig No.
1	Oscilloscope	———
2	CCD Tool	PFZZ1F780M
3	Extension Cord	PQZZ2K12Z, PQZZ8K18Z
4	Spring Height Tool	PFZZ2FP200M

2. ADJUSTING THE FEEDER PRESSURE

If misfeeding of a document such as multiple feeding or no feeding occurs frequently, try to adjust the feeder pressure by following the steps below.



(1) Slide the cover open lever forwards to open the front cover.
(2) Shift the position of the lever by using an instrument with a pointed end, like a clip or ball-point pen.
Position A: Select this when documents are not fed.
Position B: Standard position (pre-selected)
Position C: Select this when documents multiple feed.
(3) Close the front cover securely by pushing down on both ends.

3. CONFIRMING THE SEPARATION SPRING

1. Open the front cover.
2. Check the highest level of the separation spring with the spring height tool (PFZZ2FP200M). Please make sure that the separation spring does not touch the tool during this operation. (Both right and left) (See Fig. 1.)
3. Check the lowest level of the separation spring with the opposite side of the spring height tool. Please make sure that the separation spring does touch the tool during this operation. (See Fig. 2.)

Note: Be careful not to bend the separation spring.

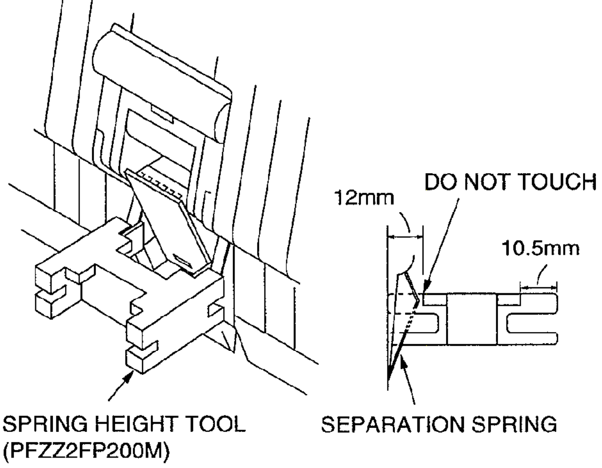

12mm
DO NOT TOUCH
10.5mm
SPRING HEIGHT TOOL
(PFZZ2FP200M)
SEPARATION SPRING

Fig. 1

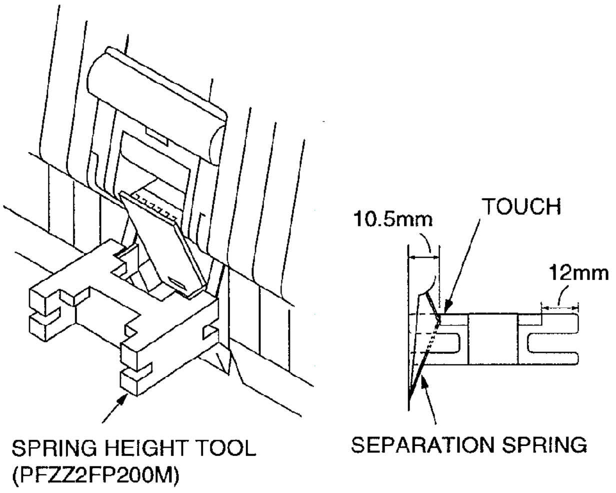

10.5mm
TOUCH
12mm
SPRING HEIGHT TOOL
(PFZZ2FP200M)
SEPARATION SPRING

Fig. 2

4. CCD ADJUSTMENTS

To obtain good print quality, perform the following adjustments after replacing the lens and/or CCD board.

4.1 PREPARATION:

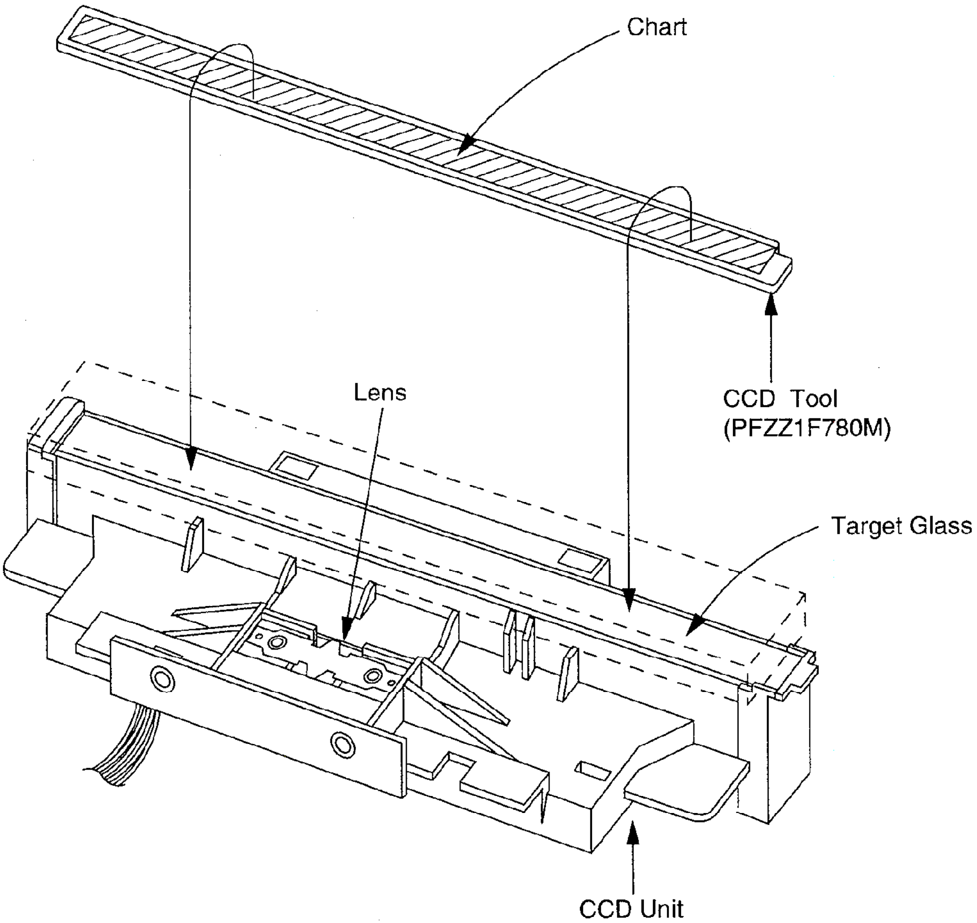
1) Remove the CCD board from the unit. (Refer to page 128.)
2) Connect the oscilloscope as shown on page 115.
3) Attach the CCD TOOL on the CCD unit.
4) Connect the CCD unit and the digital board with the extension cord (Part No. PQZZ8K18Z).
5) Connect the LED array and the digital board with the extension cord (Part No. PQZZ2K12Z).
6) Connect the AC cord.
7) Press the MENU button.
8) Press the #,9,0,0,0, and * buttons.
9) Press 5 three times.

Note:

1. Install the lens so that the marking (RED) is facing up.
2. Do not touch the glass face of the lens with bare hands.
3. If you do not have an instrument to repair the unit, cut out the chart on page 117, then attach it to the target glass (This is a temporary adjustment. You should use a CCD Tool for proper repair.)

Cleaning:

If the lens is dirty, clean it with a soft dry cloth.



Note:

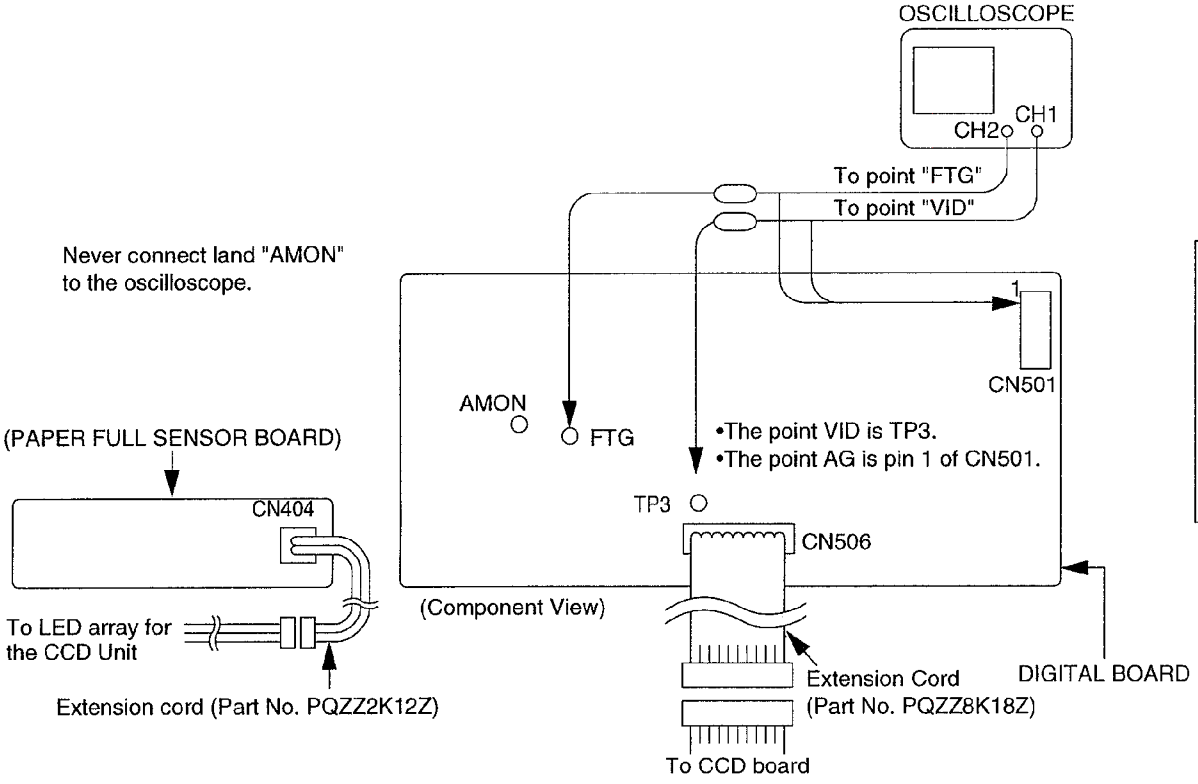
When adjusting, cover the top of the lens with your hands in order to not let in any light.

LENS AND CCD READ POSITION ADJUSTMENT

1) Loosen the lens screws and CCD board screws.
2) Adjust the position of the lens and CCD board so that the waveform appears as shown in the figure below.
3) Tighten the lens screws and CCD board screws.

Note: Make sure to observe the instructions in notes 1 and 2 on the preceding page.
Generally, the lens is first temporarily secured and the CCD board is positioned.
Then the optimum lens position is selected.

Oscilloscope setting
CH1 .... 0.5 V/div
CH2 .... 2 V/div
TIME .... 1 ms
Trigger CH2
Mode .... AC

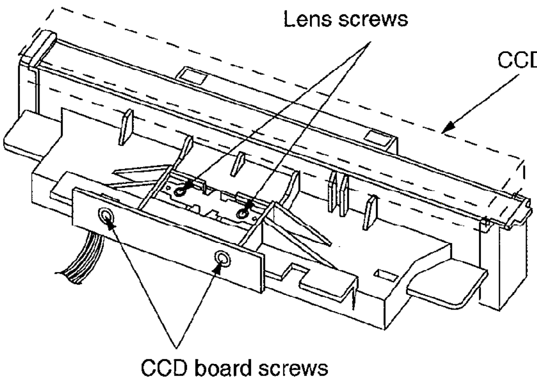

OSCILLOSCOPE
CH2
CH1
To point "FTG"
To point "VID"
1
CN501
AMON
FTG
TP3
CN506
(PAPER FULL SENSOR BOARD)
CN404
To LED array for the CCD Unit
(Component View)
DIGITAL BOARD
To CCD board

Never connect land "AMON" to the oscilloscope.

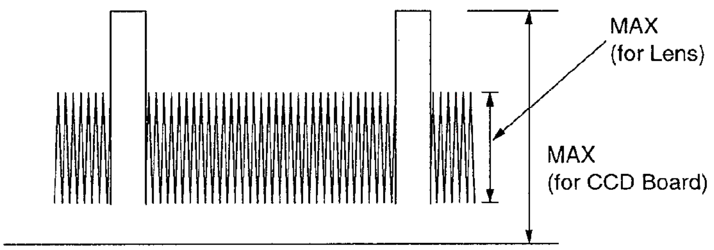
•The point VID is TP3.
•The point AG is pin 1 of CN501.

Extension cord (Part No. PQZZ2K12Z)

Extension Cord (Part No. PQZZ8K18Z)


Lens screws
CCD Tool
CCD board screws

WAVEFORM

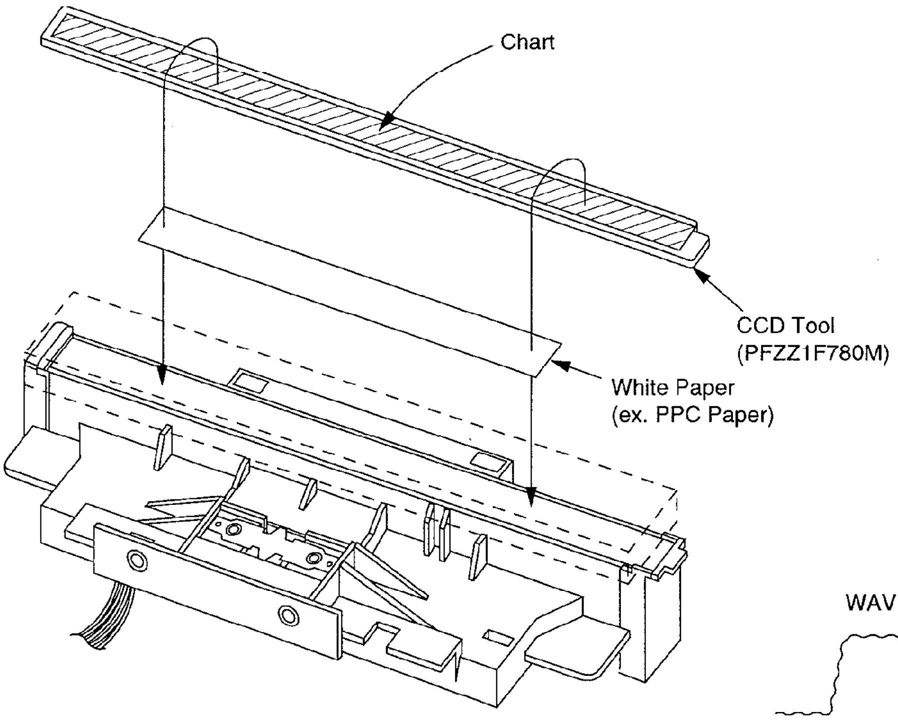

MAX
(for Lens)
MAX
(for CCD Board)

4.2 ADJUSTMENT

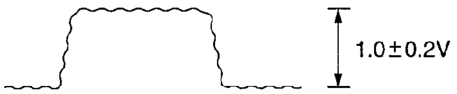
WHITE LEVEL ADJUSTMENT

1) Remove the CCD TOOL from the CCD unit.
2) Attach the white paper to the CCD unit.
3) Attach the CCD TOOL to the CCD unit.
4) Adjust VR801 on the CCD board so that the waveform becomes 1.2± 0.2V.

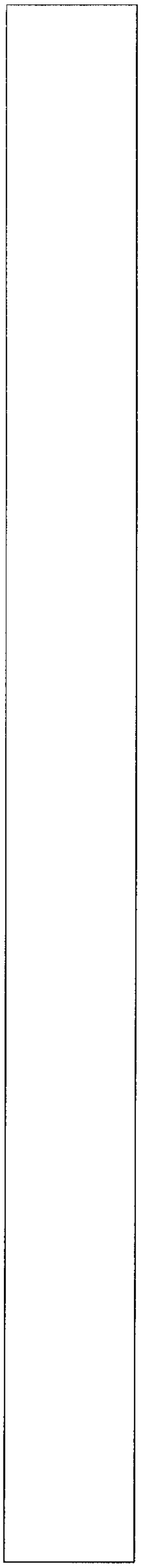
Note: 1. After the adjustment is finished, assemble the unit by reversing the procedure above.
2. While making adjustments, cover the top of the lens (such as a thick piece of paper) to prevent light from entering.
3. If you do not have an instrument to repair the unit, cut out the chart on the next page, then attach it to the target glass.
(This is a temporary adjustment. You should use a CCD Tool for this for accurate repair.)



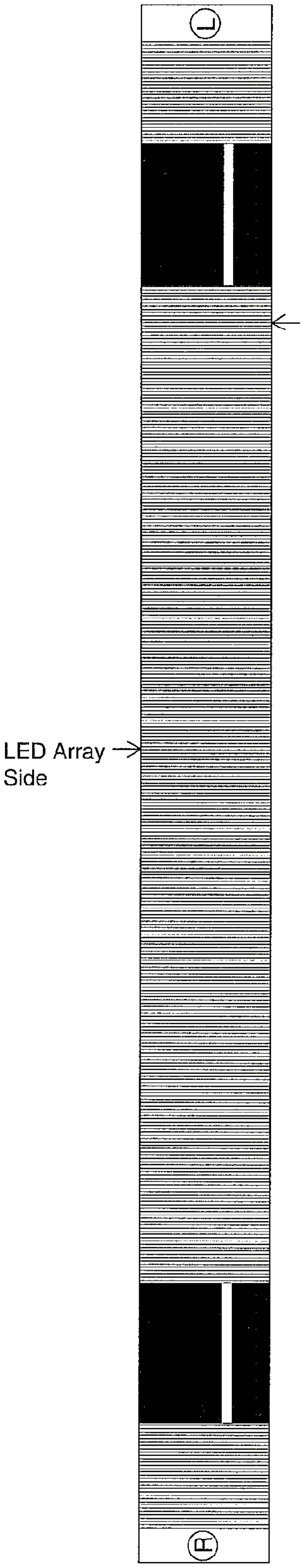
WAVE FORM

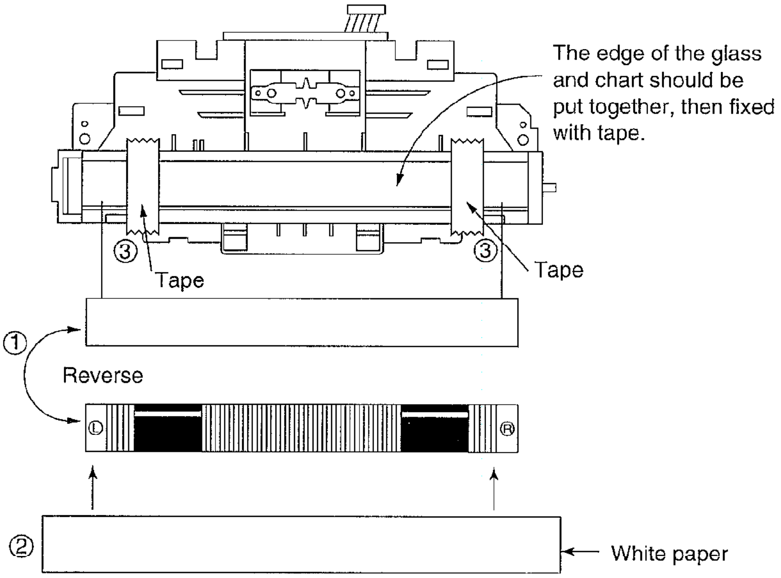


(For white level adjustment)



(For lens and CCD read position adjustment)


Ⓛ
Edge of the glass
LED Array Side
Ⓡ


The edge of the glass and chart should be put together, then fixed with tape.
③
Tape
③
Tape
①
Reverse
Ⓛ
Ⓡ
②
White paper

5. DOCUMENT READ START POSITION ADJUSTMENT

1) Connect the AC cord.
2) Copy the document and confirm the read start position of the document. Compare the printed result with the original document.
3) If out of position, adjust the read position.
4) Press the MENU button.
5) Press the #, 9, 0, 0, 0,   and 5, 6, 3 buttons.
6) Press the ☐,☐, SET and MENU buttons.

30
.
. To move the image to the right
. ↑
16
15 ← Standard (Default)
14 ↓
.
. To move the image to the left
.
00

The read start position shifts 1 mm for each number.

DISASSEMBLY INSTRUCTIONS

Page

1. How to Remove the Handset Cradle, Speaker and Hook Switch Board 121
2. How to Remove the Operation Panel Block 122
3. How to Remove the Thermal Head 123
4. How to Remove the Operation Board, LCD and Document Guide .. 124
5. How to Remove the Bottom Frame 124
6. How to Remove the Analog, Digital, Power Supply, Paper Top Sensor Boards and AC Inlet .... 125~127
7. How to Remove the Lower Cabinet and Film End Sensor Board 128
8. How to Remove the CCD Unit and Paper Full Sensor Board 128
9. How to Remove the Motor Block 129
10. How to Remove the Pickup and Separation Rollers 129
11. How to Remove the Platen Roller 130
12. How to Remove the Document Feed Roller 130
13. How to Remove the Document Tray 131
14. How to Replace Flat Package IC 132, 133

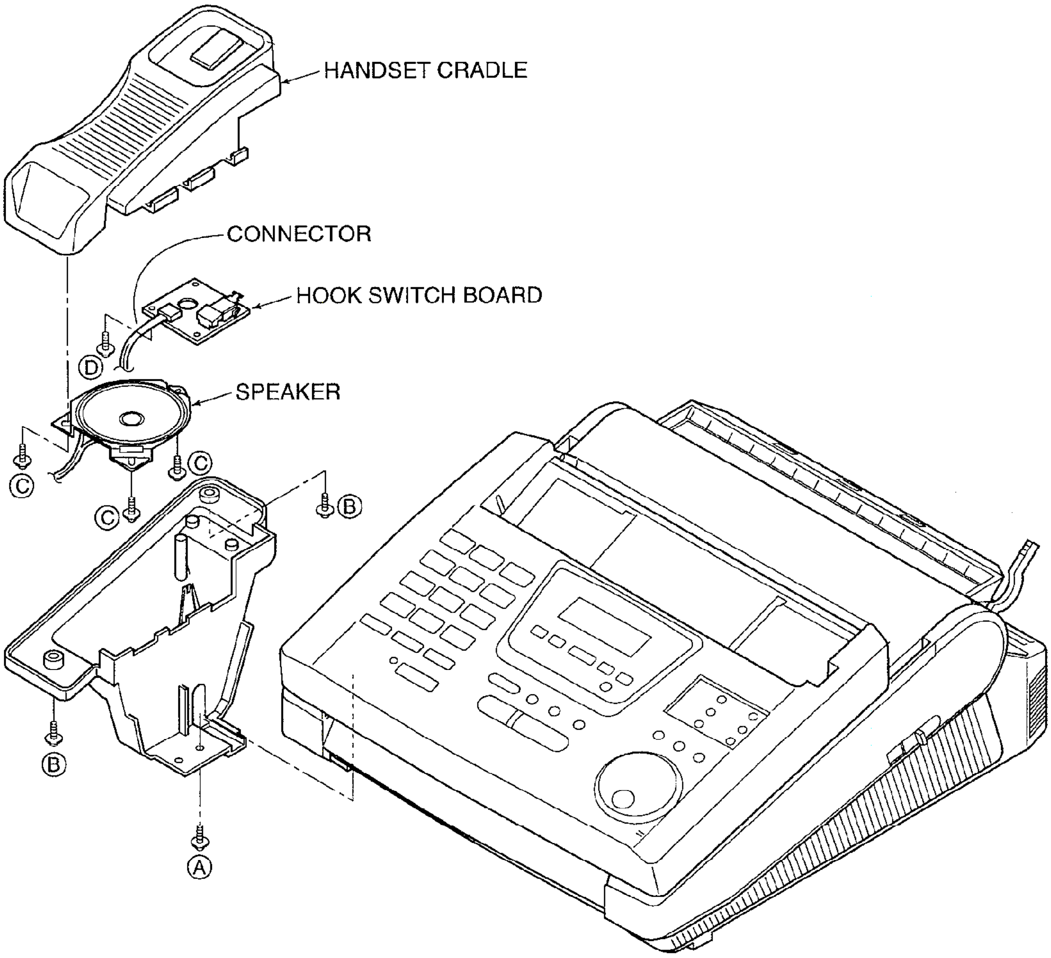
Ref. No. 1

HOW TO REMOVE THE HANDSET CRADLE, SPEAKER AND HOOK SWITCH BOARD

Procedure 1

- Remove accessories, such as the cassette tray and power cord, before disassembling the unit.

1) Remove the screw Ⓐ.
2) Remove the 2 screws Ⓑ.
3) Remove the bottom frame. (See Ref. No.5.)
4) Remove the handset cradle.
5) Remove the 3 screws Ⓒ.
6) Remove the speaker.
7) Remove the 1 screw Ⓓ.
8) Remove the connector.
9) Remove the hook switch board.


HANDSET CRADLE
CONNECTOR
HOOK SWITCH BOARD
Ⓓ
SPEAKER
Ⓒ
Ⓒ
Ⓒ
Ⓑ
Ⓑ
Ⓐ

Ref. No. 2

HOW TO REMOVE THE OPERATION PANEL BLOCK

Procedure 2

1) Push the front lid open lever in the direction of the arrow to the open the operation panel block.
2) Tilt the unit on it's side so that the front lid open lever side is facing down on a flat surface (ie. table). While holding down on the arm shaded grey in Fig. A ①, insert a screwdriver and remove the arm by pressing up on the arm with the screwdriver ②.
3) Press the arms on both sides outward. (See Fig. B.)
4) Remove the operation panel block.

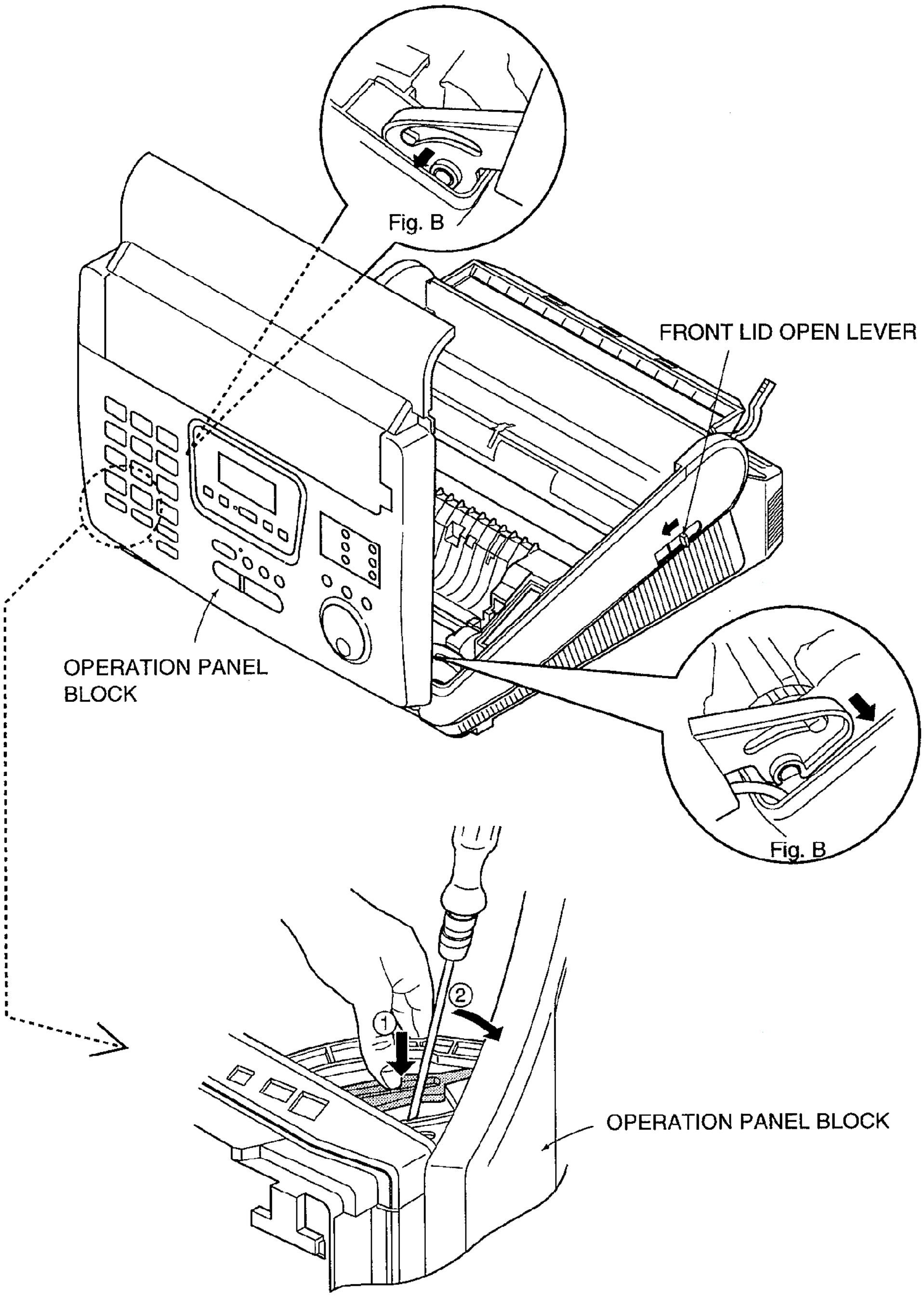


Fig. B
FRONT LID OPEN LEVER
OPERATION PANEL BLOCK
Fig. B
①
②
OPERATION PANEL BLOCK

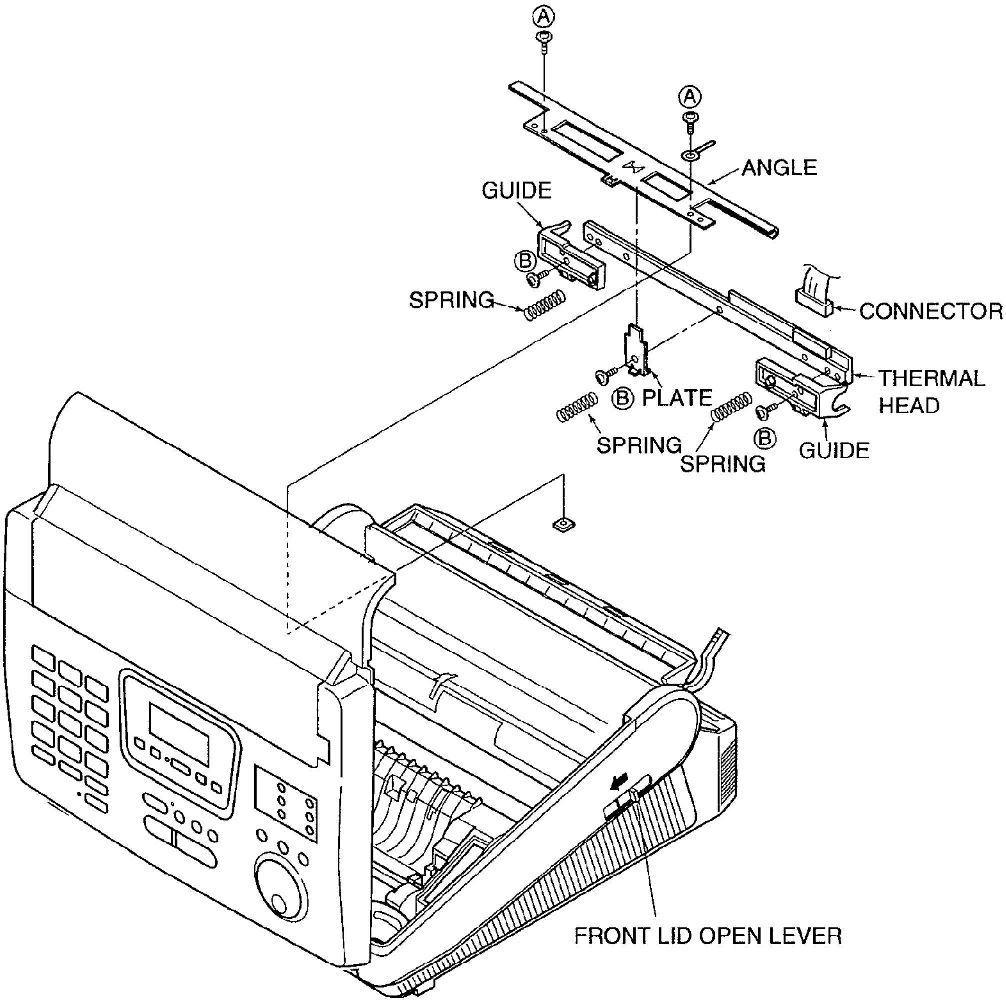
Fig. A

Ref. No. 3

HOW TO REMOVE THE THERMAL HEAD

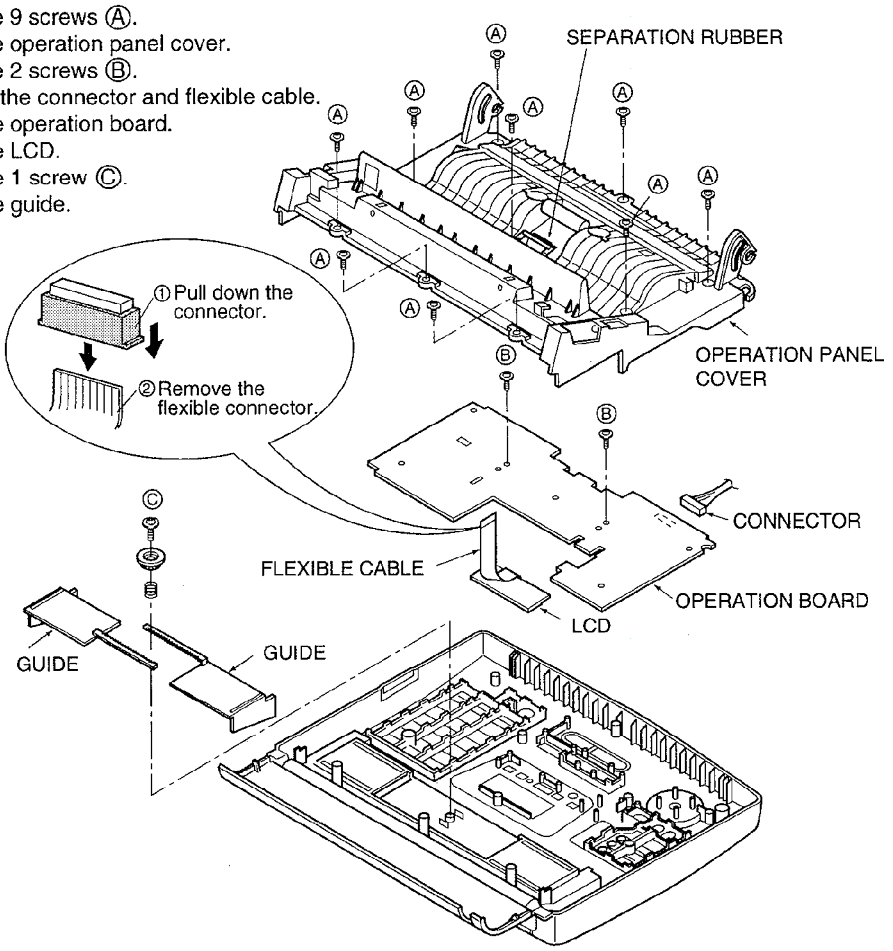
Procedure 3

1) Push the front lid open lever in the direction of the arrow to open the operation panel.
2) Remove the 2 screws Ⓐ.
3) Remove the angle.
4) Disconnect the connector.
5) Remove the thermal head block.
6) Remove the 3 screws Ⓑ.
7) Remove the 2 guides and plate.
8) Remove the 3 springs.
9) Replace the thermal head.


Ⓐ
Ⓐ
ANGLE
GUIDE
Ⓑ
SPRING
CONNECTOR
THERMAL HEAD
Ⓑ PLATE
SPRING
SPRING
Ⓑ
GUIDE
FRONT LID OPEN LEVER

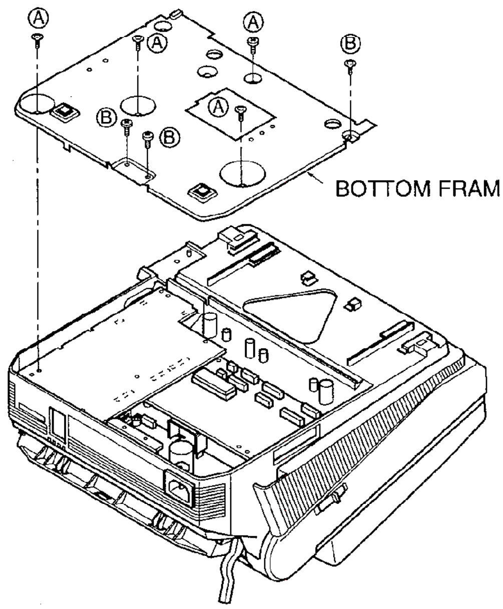
Ref. No. 4	HOW TO REMOVE THE OPERATION BOARD, LCD AND DOCUMENT GUIDE
Procedure 2→4	

1) Remove the 9 screws Ⓐ.
2) Remove the operation panel cover.
3) Remove the 2 screws Ⓑ.
4) Disconnect the connector and flexible cable.
5) Remove the operation board.
6) Remove the LCD.
7) Remove the 1 screw Ⓒ.
8) Remove the guide.


Ⓐ
SEPARATION RUBBER
Ⓐ
Ⓐ
Ⓐ
Ⓐ
Ⓐ
Ⓐ
Ⓐ
Ⓐ
Ⓐ
① Pull down the connector.
② Remove the flexible connector.
Ⓑ
OPERATION PANEL COVER
Ⓑ
Ⓒ
CONNECTOR
FLEXIBLE CABLE
OPERATION BOARD
LCD
GUIDE
GUIDE

Ref. No. 5	HOW TO REMOVE THE BOTTOM FRAME
Procedure 5	

1) Remove the 4 screws Ⓐ.
2) Remove the 3 screws Ⓑ.
3) Remove the bottom frame.

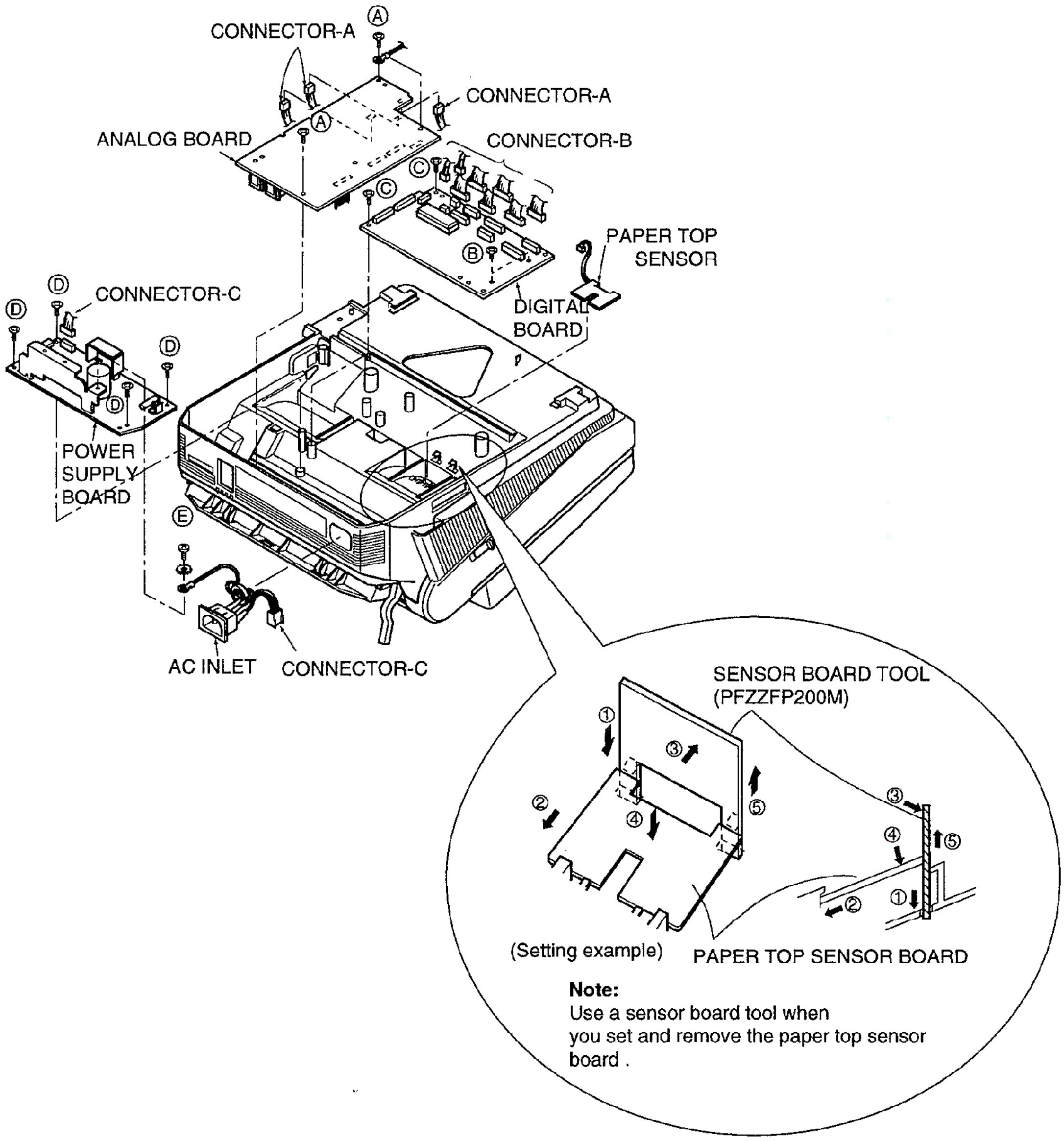

Ⓐ
Ⓐ
Ⓐ
Ⓑ
Ⓐ
Ⓑ
Ⓑ
BOTTOM FRAME

Ref. No. 6

HOW TO REMOVE THE ANALOG, DIGITAL, POWER SUPPLY, PAPER TOP SENSOR BOARDS AND AC INLET

Procedure 5→6

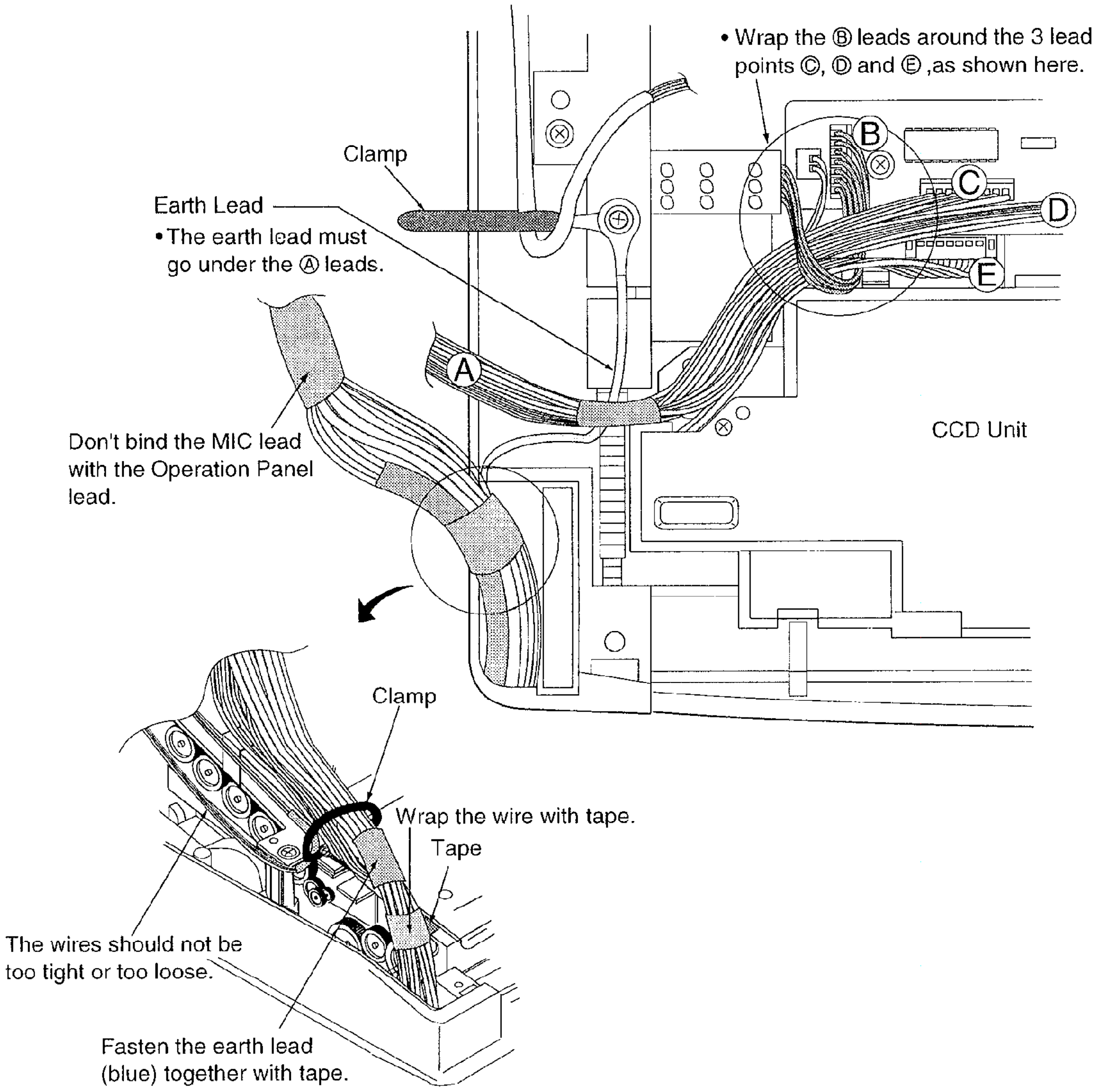
1) Remove the 3 screws Ⓐ.
2) Remove the analog board.
3) Disconnect the 3 connectors-A.
4) Remove the 8 connectors-B.
5) Remove the 2 screws Ⓑ.
6) Remove the 2 screws Ⓒ.
7) Remove the digital board.
8) Remove the 4 screws Ⓓ.
9) Remove the 1 screw Ⓔ.
10) Disconnect the 2 connectors-C.
11) Remove the power supply board.
12) Remove the AC inlet.
13) Remove the paper top sensor board.


CONNECTOR-A
Ⓐ
CONNECTOR-A
ANALOG BOARD
Ⓐ
CONNECTOR-B
Ⓒ
Ⓒ
Ⓑ
PAPER TOP SENSOR
DIGITAL BOARD
Ⓓ
Ⓓ
CONNECTOR-C
Ⓓ
Ⓓ
POWER SUPPLY BOARD
Ⓔ
AC INLET
CONNECTOR-C
SENSOR BOARD TOOL (PFZZFP200M)
①
②
③
④
⑤
③
④
⑤
②
①
(Setting example)
PAPER TOP SENSOR BOARD

Note:
Use a sensor board tool when you set and remove the paper top sensor board .

NOTE:
Refer to pages 126 and 127 for the installation position of the lead wire.

INSTALLATION POSITION OF THE LEAD WIRE



• Wrap the Ⓑ leads around the 3 lead points Ⓒ, Ⓓ and Ⓔ ,as shown here.

Earth Lead
•The earth lead must go under the Ⓐ leads.

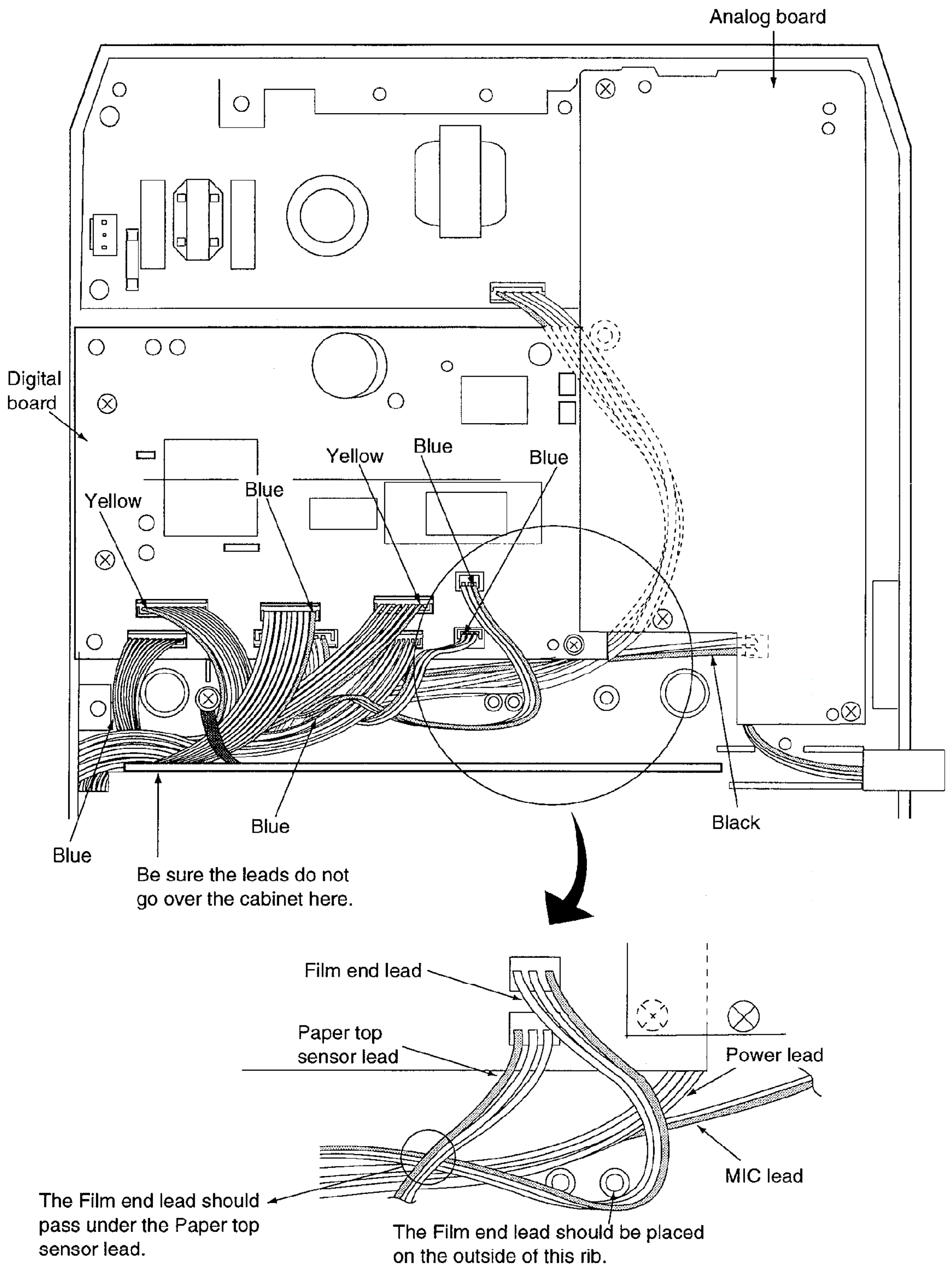
Don't bind the MIC lead with the Operation Panel lead.

Wrap the wire with tape.

The wires should not be too tight or too loose.

Fasten the earth lead (blue) together with tape.

(Continued)


Analog board
Digital board
Yellow
Blue
Yellow
Blue
Blue
Blue
Blue
Black
Be sure the leads do not go over the cabinet here.
Film end lead
Paper top sensor lead
Power lead
MIC lead
The Film end lead should pass under the Paper top sensor lead.
The Film end lead should be placed on the outside of this rib.

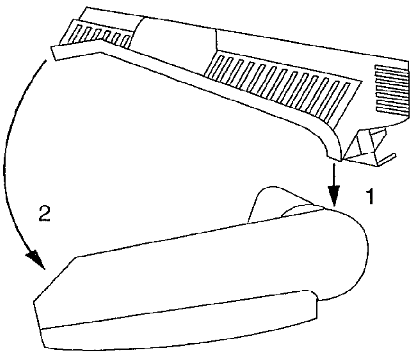
Ref. No. 7

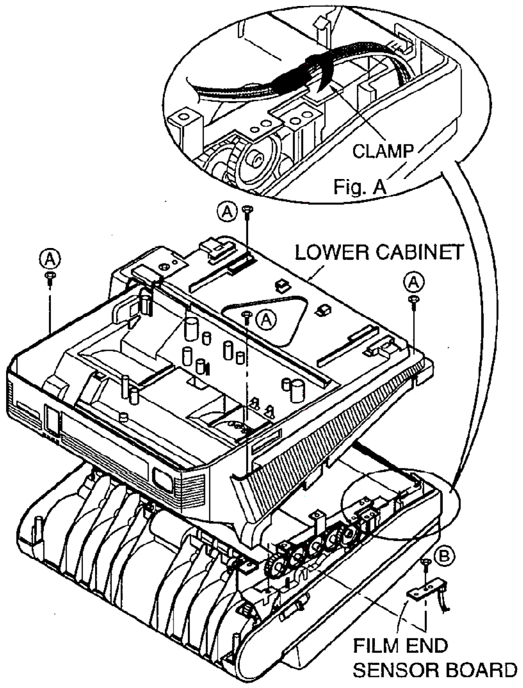
HOW TO REMOVE THE LOWER CABINET AND FILM END SENSOR BOARD

Procedure
1→5→6→7

1) Remove the 4 screws Ⓐ.
2) Remove the lower cabinet.
3) Remove the 1 screw Ⓑ.
3) Remove the film end sensor board.

NOTE:
When you close the lower cabinet, insert the back side first then set the front side.



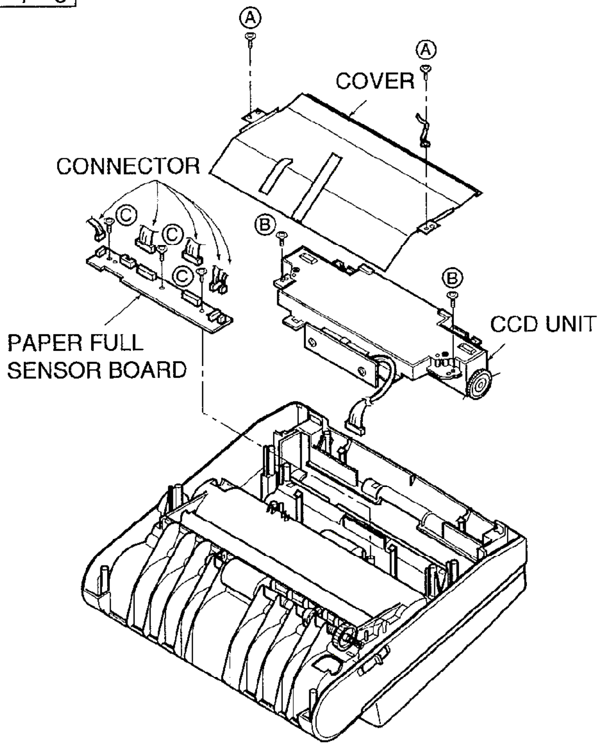

CLAMP
Fig. A
Ⓐ
LOWER CABINET
Ⓐ
Ⓐ
Ⓐ
Ⓑ
FILM END
SENSOR BOARD

※ Before attaching the lower cabinet, attach the cables exposed from the upper cabinet to the clamp. (Fig. A)

Ref. No. 8

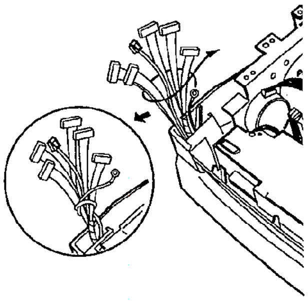
HOW TO REMOVE THE CCD UNIT AND PAPER FULL SENSOR BOARD

Procedure
5→6→7→8


Ⓐ
Ⓐ
COVER
CONNECTOR
Ⓒ
Ⓒ
Ⓒ
Ⓑ
Ⓑ
PAPER FULL
SENSOR BOARD
CCD UNIT

(CCD UNIT)
1) Remove the 2 screws Ⓐ.
2) Remove the cover.
3) Remove the 2 screws Ⓑ.
4) Remove the CCD UNIT.

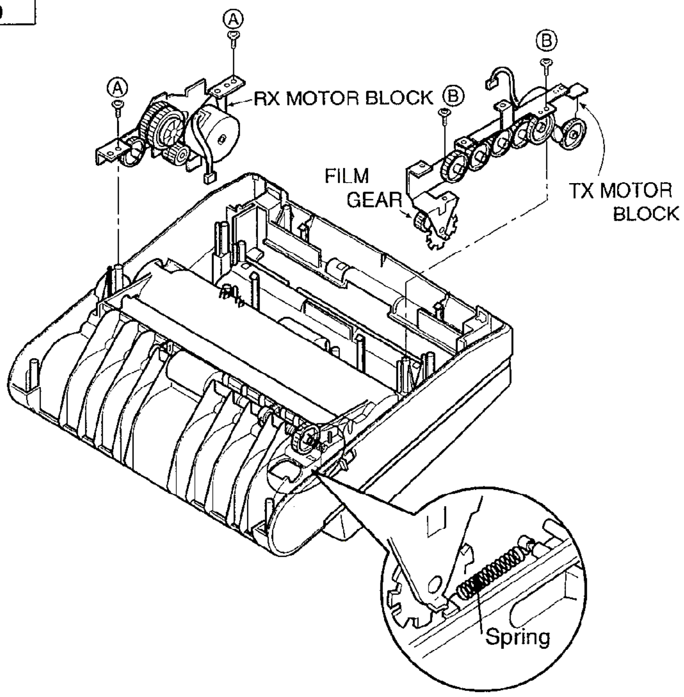
(PAPER FULL SENSOR BOARD)
1) Disconnect the 5 connectors.
2) Remove the 3 screws Ⓒ.
3) Remove the paper full sensor board.



Note:
When assembling, tie the lead lines together as shown above, to prevent them from being caught in the cabinet.

HOW TO CLEAN:
Clean the target glass on the CCD unit with a cloth soaked in alcohol.

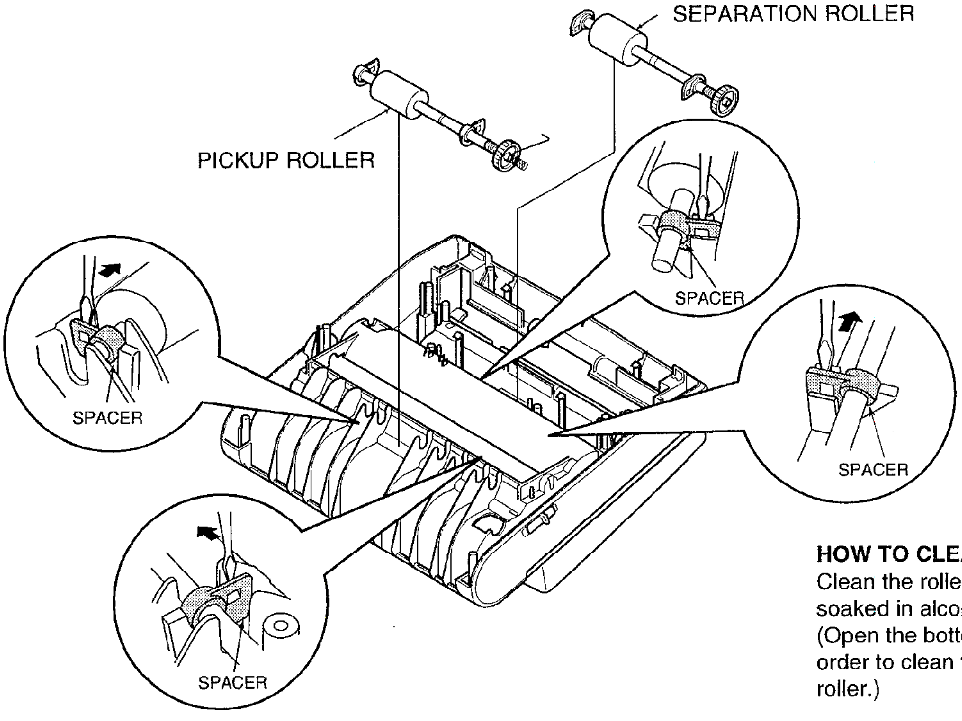
Ref. No. 9	HOW TO REMOVE THE MOTOR BLOCK
Procedure 5→6→7 →8→9	


Ⓐ
Ⓐ
Ⓑ
RX MOTOR BLOCK Ⓑ
FILM GEAR
TX MOTOR BLOCK
Spring

1) Remove the 2 screws Ⓐ.
2) Remove the RX motor block.
3) Remove the 2 screws Ⓑ.
4) Remove the spring.
5) Remove the TX motor block.

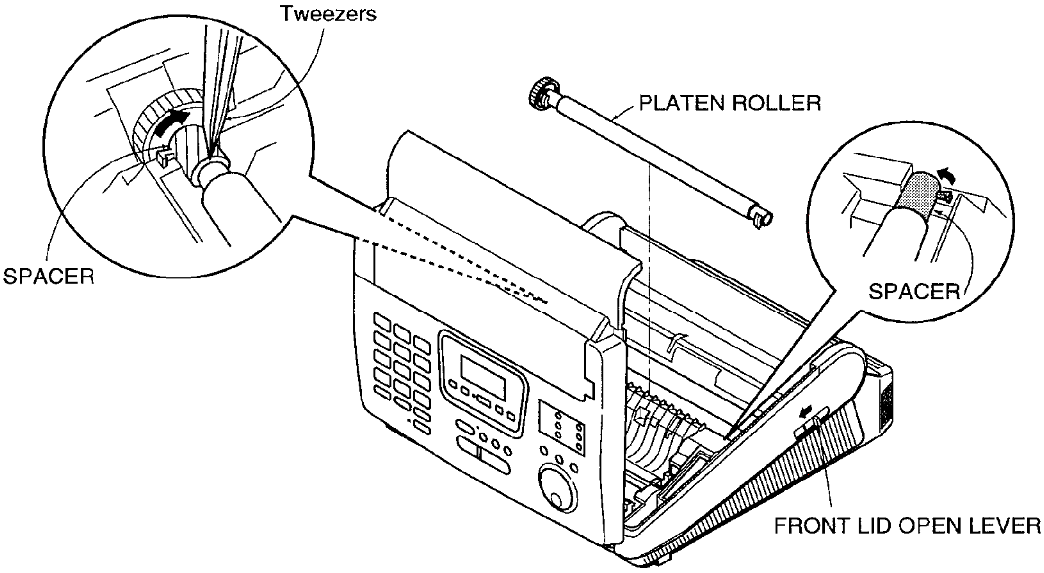
Ref. No. 10	HOW TO REMOVE THE PICKUP AND SEPARATION ROLLERS
Procedure 5→6→7→8 →9→10	

1) Remove the spacer with a flat head screwdriver.
2) Remove the pickup roller or separation roller.
3) Remove the gears and spacers
   from the roller shaft, and replace the roller.

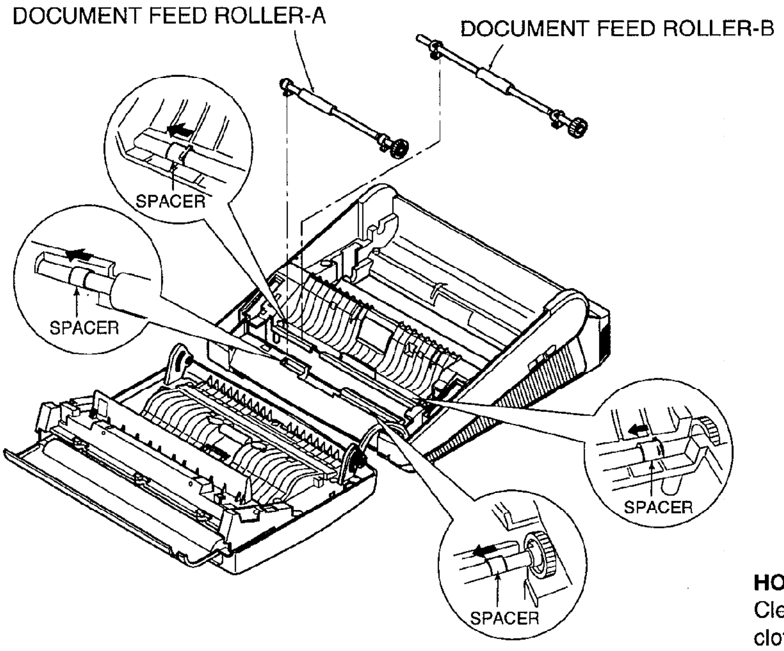

SEPARATION ROLLER
PICKUP ROLLER
SPACER
SPACER
SPACER
SPACER

HOW TO CLEAN:
Clean the roller with a cloth soaked in alcohol.
(Open the bottom cabinet in order to clean the pickup roller.)

Ref. No. 11	**HOW TO REMOVE THE PLATEN ROLLER**
Procedure 11	1) If the film cartridge is still installed, remove it. 2) Push the front lid open lever in the direction of the arrow to the operation panel. 3) Remove the spacer as shown below. 4) Remove the platen roller.


Tweezers
PLATEN ROLLER
SPACER
SPACER
FRONT LID OPEN LEVER

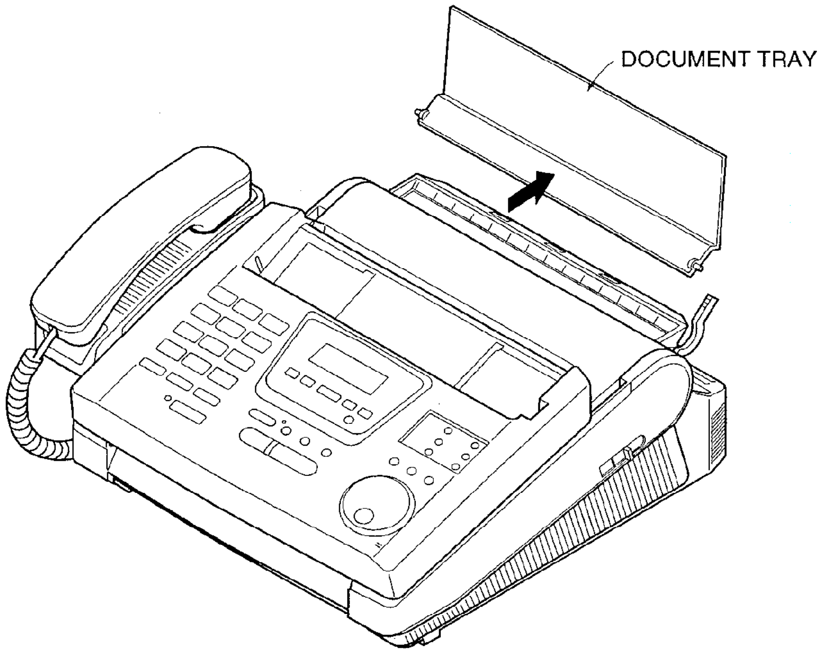
Ref. No. 12	**HOW TO REMOVE THE DOCUMENT FEED ROLLER**
Procedure 2→12	(DOCUMENT FEED ROLLER-A) 1) Slide both side spacers and remove the roller. (DOCUMENT FEED ROLLER-B) 1) Remove the RX motor block. (See Ref. No. 9.) 2) Slide the spacers and remove the roller.


DOCUMENT FEED ROLLER-A
DOCUMENT FEED ROLLER-B
SPACER
SPACER
SPACER
SPACER

HOW TO CLEAN:
Clean the roller with a cloth soaked in alcohol.

Ref. No. 13	HOW TO REMOVE THE DOCUMENT TRAY
Procedure 13	

1) Push the center section in the direction of the arrow to remove the document tray.



HOW TO REPLACE THE FLAT PACKAGE IC

If you do not have the special tools (for example, SPOT HEATER) to remove the SPOT HEATER'S Flat IC, if you have solder (large amount), a soldering iron and cutter knife, you can easily remove the ICs even if there are more than 100 pins.

1. PREPARATION

- SOLDER - - - - - - - Sparkle Solder 115A-1, 115B-1
  OR
  Almit Solder KR-19, KR-19RMA
- Soldering iron - - - - - Recommended power consumption is between 30 W to 40 W.
  Temperature of Copper Rod 662 ± 50 °F (350 ±10℃)

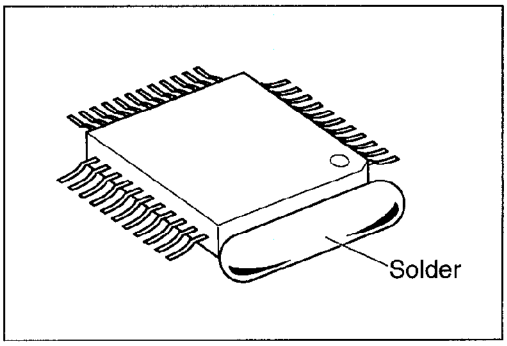
  (An expert may handle a 60~80 W iron, but a beginner might damage the foil by overheating.)
- Flux - - - - - - - - - - HI115 Specific gravity 0.863

  (Original flux should be replaced daily.)

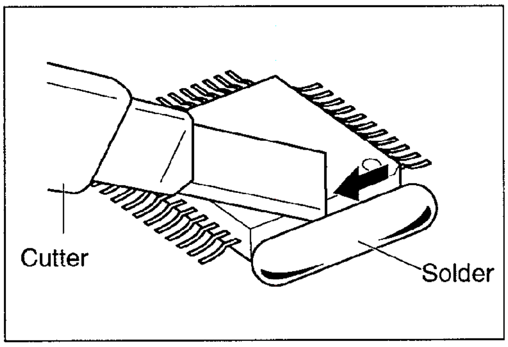
2. FLAT PACKAGE IC REMOVAL PROCEDURE

1) When all of the IC leads cannot been seen at the standard degree, fill with large quantities of solder.

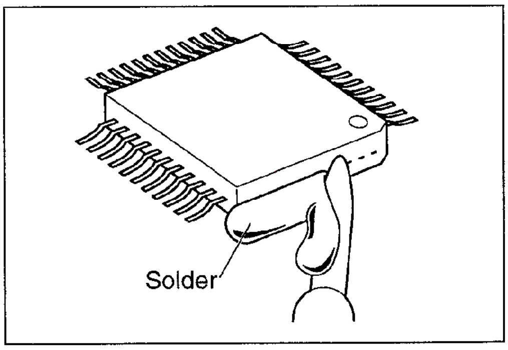
Note:
If you do not fill with solder and directly cut the IC lead with the cutter, stress may build up directly in the P.C. board's pattern. If you do not fill with large quantities of solder as in step 1, the P.C. board pattern may be removed.



2) Using a cutter, cut the lead at the source.
(Cut the contents with a cutter lightly, 5 or 6 times.)



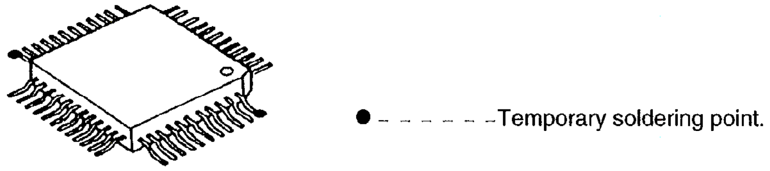
3) Remove when the solder melts.
(Remove the lead at the same time.)



After removing the Flat IC and when attaching a new IC, remove any of the excess solder on the land using the soldering wire, etc. If the excess solder is not removed from the land, the IC will slip and not be attached properly.

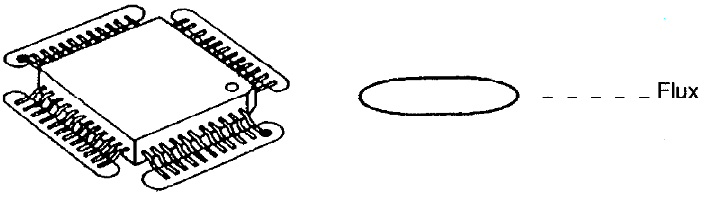
3. FLAT PACKAGE IC INSTALLATION PROCEDURE

1) Temporarily fix the FLAT PACKAGE IC by soldering on the two marked pins.

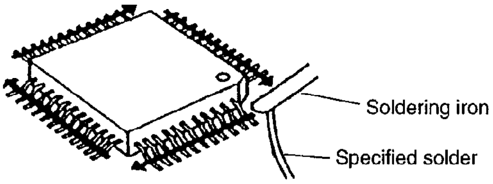


*Check the accuracy of the IC setting with the corresponding soldering foil.

2) Apply flux to all pins of the FLAT PACKAGE IC.



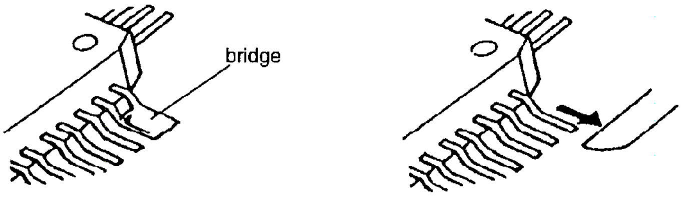
3) Solder using the specified solder, in the direction of the arrow, by sliding the soldering iron.



4. BRIDGE MODIFICATION PROCEDURE

1) Lightly resolder the bridged portion.

2) Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



MEMO

CIRCUIT OPERATIONS

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4. Facsimile Section .... 149~161
5. MODEM Section .... 162~168
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7. NCU Section 171, 172
8. ITS and Monitor Section 173, 174
9. ATAS Section 175
10. Analog Gate Array 176, 177
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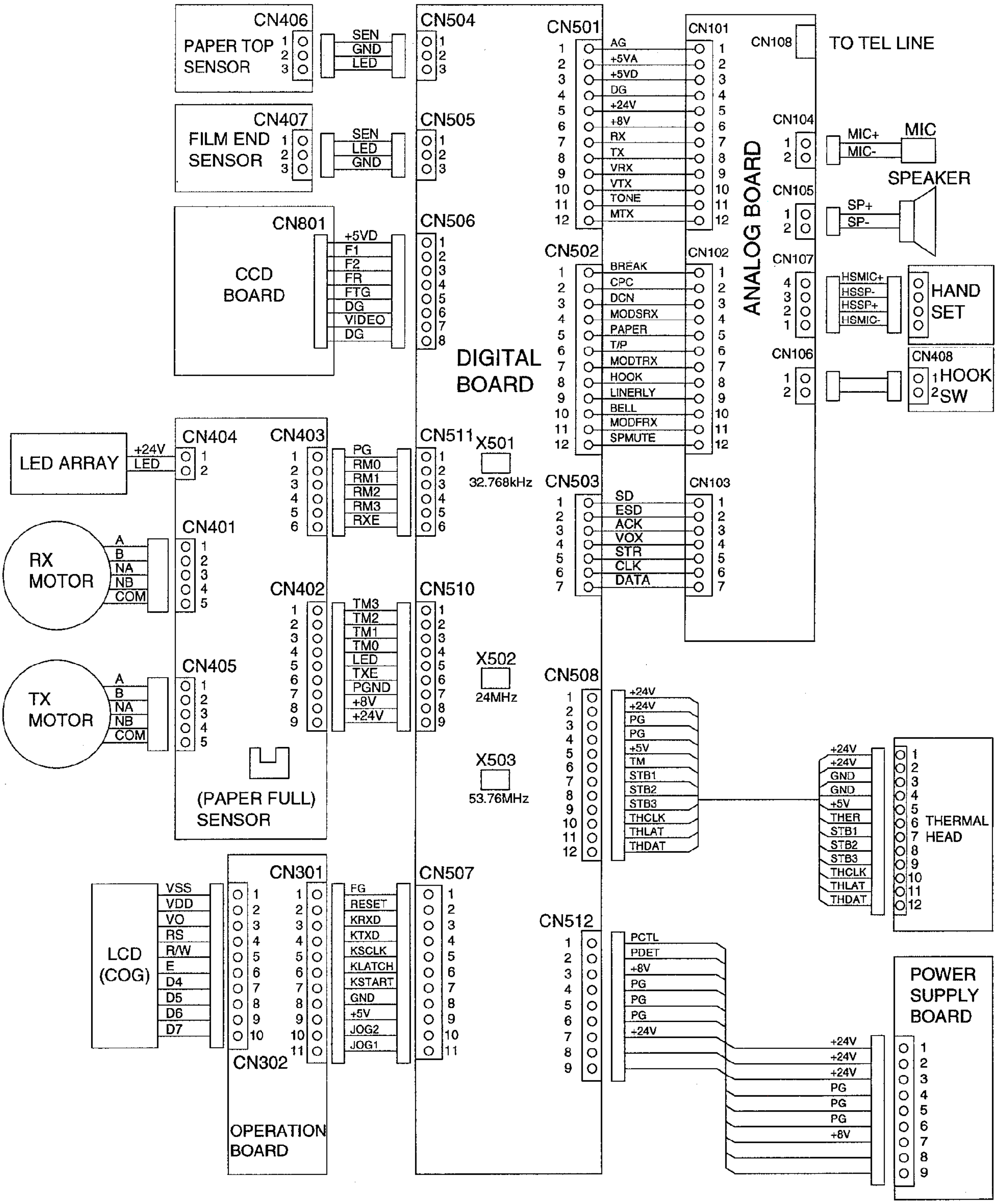
12. LCD Section 179
13. Power Supply Board Switching Section .... 180~182

KX-FP270

1.CONNECTION DIAGRAM

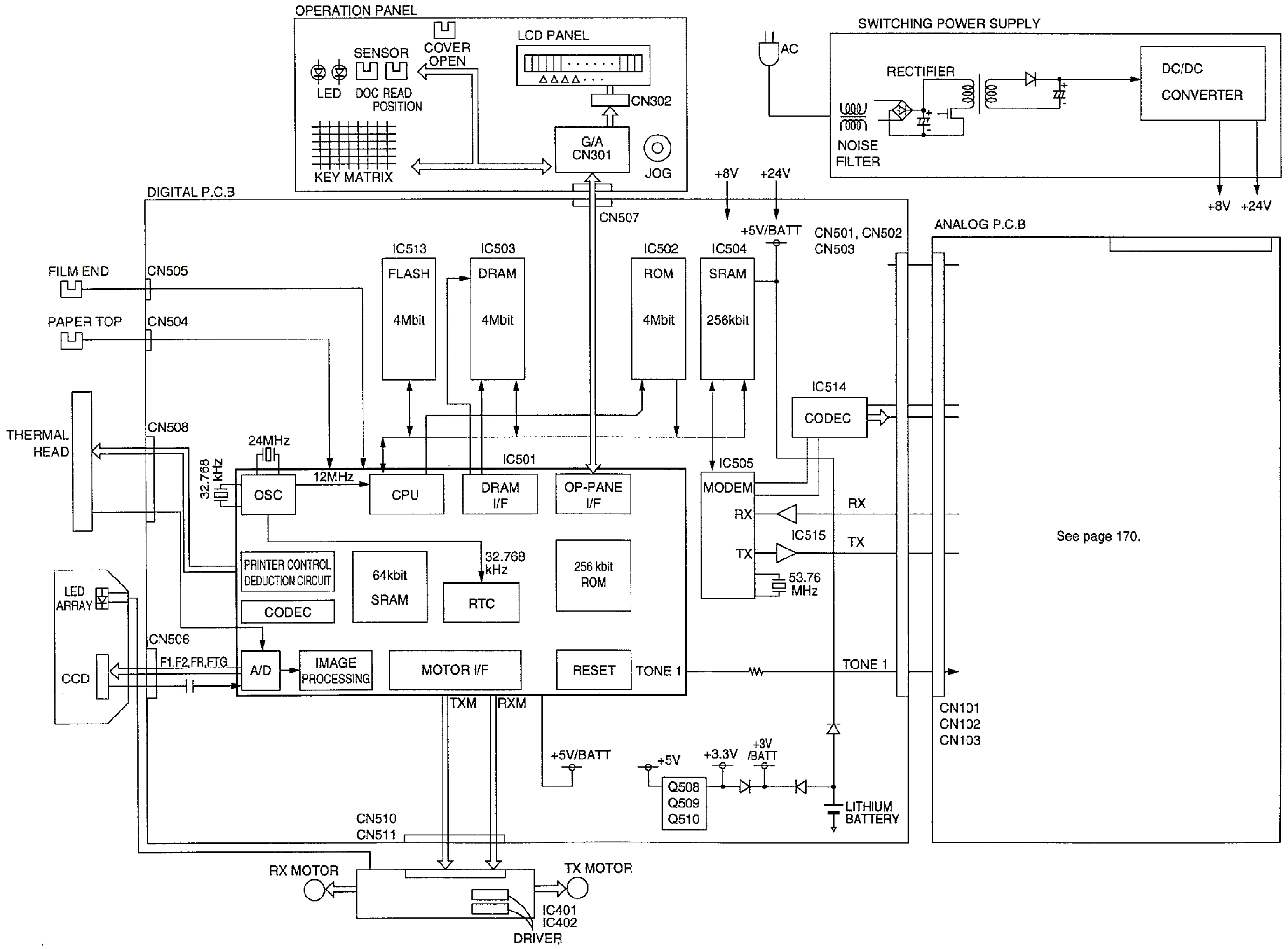

CN406
PAPER TOP SENSOR
SEN
GND
LED
CN504
CN407
FILM END SENSOR
SEN
LED
GND
CN505
CN801
CCD BOARD
+5VD
F1
F2
FR
FTG
DG
VIDEO
DG
CN506
DIGITAL BOARD
CN501
AG
+5VA
+5VD
DG
+24V
+8V
RX
TX
VRX
VTX
TONE
MTX
CN101
CN108
TO TEL LINE
ANALOG BOARD
CN104
MIC+
MIC-
MIC
CN105
SPEAKER
SP+
SP-
CN502
BREAK
CPC
DCN
MODSRX
PAPER
T/P
MODTRX
HOOK
LINERLY
BELL
MODFRX
SPMUTE
CN102
CN107
HSMIC+
HSSP-
HSSP+
HSMIC-
HAND SET
CN106
CN408
HOOK SW
LED ARRAY
+24V
LED
CN404
CN403
PG
RM0
RM1
RM2
RM3
RXE
CN511
X501
32.768kHz
CN503
SD
ESD
ACK
VOX
STR
CLK
DATA
CN103
CN401
RX MOTOR
A
B
NA
NB
COM
CN402
TM3
TM2
TM1
TM0
LED
TXE
PGND
+8V
+24V
CN510
X502
24MHz
CN405
TX MOTOR
A
B
NA
NB
COM
X503
53.76MHz
CN508
+24V
+24V
PG
PG
+5V
TM
STB1
STB2
STB3
THCLK
THLAT
THDAT
+24V
+24V
GND
GND
+5V
THER
STB1
STB2
STB3
THCLK
THLAT
THDAT
THERMAL HEAD
(PAPER FULL) SENSOR
LCD (COG)
VSS
VDD
VO
RS
R/W
E
D4
D5
D6
D7
CN301
CN302
FG
RESET
KRXD
KTXD
KSCLK
KLATCH
KSTART
GND
+5V
JOG2
JOG1
CN507
CN512
PCTL
PDET
+8V
PG
PG
PG
+24V
POWER SUPPLY BOARD
+24V
+24V
+24V
PG
PG
PG
+8V
OPERATION BOARD

2. GENERAL BLOCK DIAGRAM

The control section will be explained as shown in the block diagram.

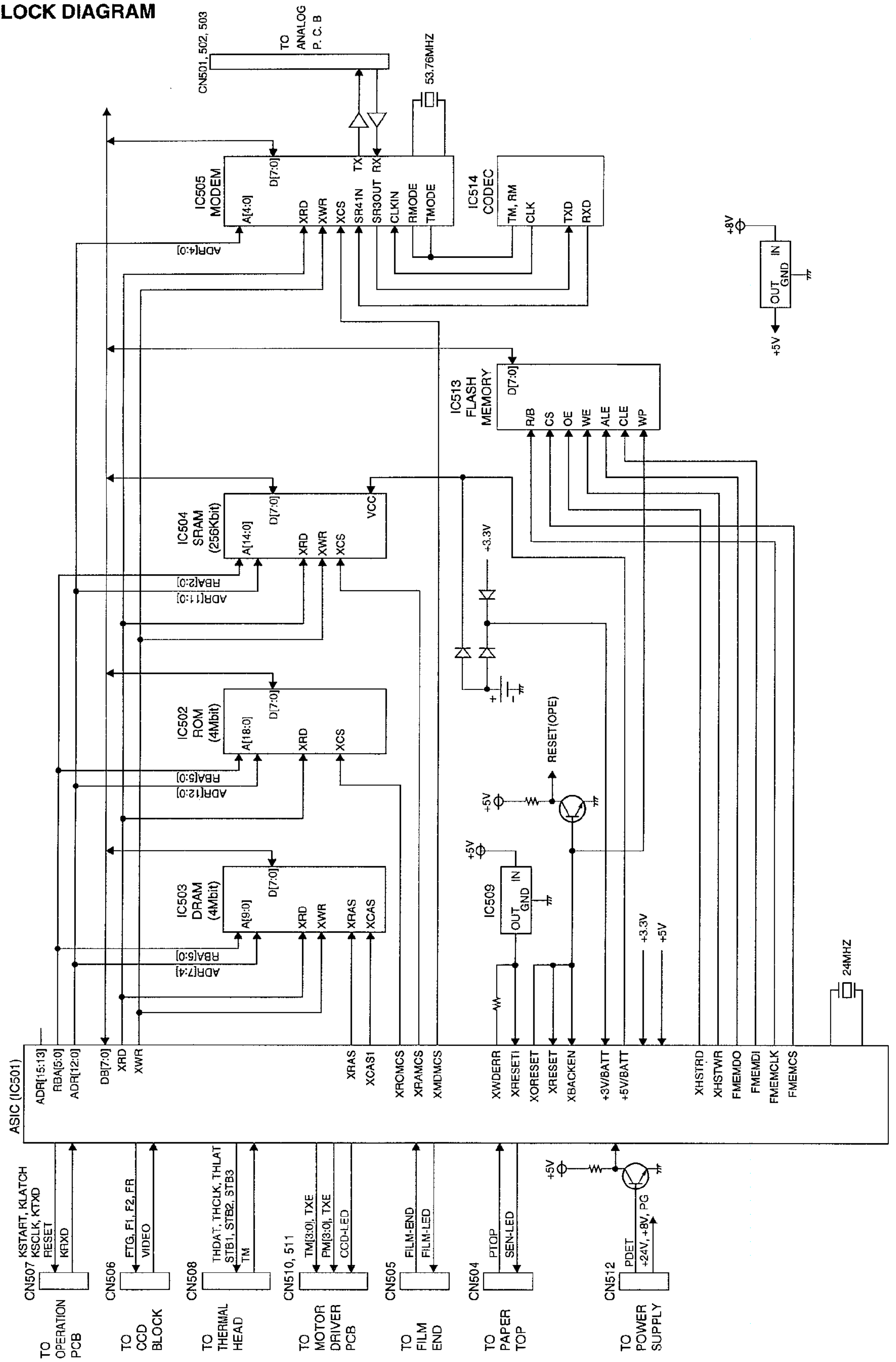
1) ASIC (IC501)	Composed mainly of an address decoder and modem control section. Controls the general FAX operations. Controls the operation panel I/F. Controls the thermal head I/F and CCD I/F. Executes image processing. CPU and Real time clock Provides the reset pulse to each of the major ICs.
2) ROM (IC502)	Contains all of the program instructions for unit operations.
3) Static RAM (IC504)	This memory is used mainly for the parameter working storage area.
4) Dynamic RAM (IC503)	This memory is used mainly for the parameter working storage area.
5) MODEM (IC505)	Executes modulation and demodulation for FAX communication.
6) Read Section	CCD image sensor to read transmitting documents.
7) Motor Driver (IC401,IC402)	Drives the transmission motor and the reception motor.
8) Thermal Head	Contains heating elements for dot matrix image printing.
9) Analog Board	Composed of an ITS circuit and NCU circuit.
10) Sensor Section	Composed of a cover open sensor, document sensor, read position sensor, set paper switch, paper full sensor, paper top sensor and film end sensor.
11) Power Supply Board Switching Section	Supplies +8V and +24V to the unit.
12) Flash Memory (IC513)	This memory is used for voice prompt and TAM.

General Block Diagram


OPERATION PANEL
SENSOR
COVER OPEN
LCD PANEL
LED
DOC READ POSITION
CN302
G/A CN301
KEY MATRIX
JOG
SWITCHING POWER SUPPLY
AC
RECTIFIER
DC/DC CONVERTER
NOISE FILTER
+8V
+24V
+8V +24V
DIGITAL P.C.B
CN507
+5V/BATT
CN501, CN502
CN503
ANALOG P.C.B
FILM END
CN505
PAPER TOP
CN504
IC513
FLASH
4Mbit
IC503
DRAM
4Mbit
IC502
ROM
4Mbit
IC504
SRAM
256kbit
IC514
CODEC
THERMAL HEAD
CN508
24MHz
32.768 kHz
IC501
12MHz
OSC
CPU
DRAM I/F
OP-PANE I/F
IC505
MODEM
RX
TX
IC515
RX
TX
53.76 MHz
See page 170.
PRINTER CONTROL DEDUCTION CIRCUIT
64kbit SRAM
32.768 kHz
RTC
256 kbit ROM
CODEC
LED ARRAY
CN506
F1,F2,FR,FTG
CCD
A/D
IMAGE PROCESSING
MOTOR I/F
RESET
TONE 1
TONE 1
CN101
CN102
CN103
TXM
RXM
+5V/BATT
+5V
+3.3V
+3V /BATT
Q508
Q509
Q510
LITHIUM BATTERY
CN510
CN511
RX MOTOR
TX MOTOR
IC401
IC402
DRIVER

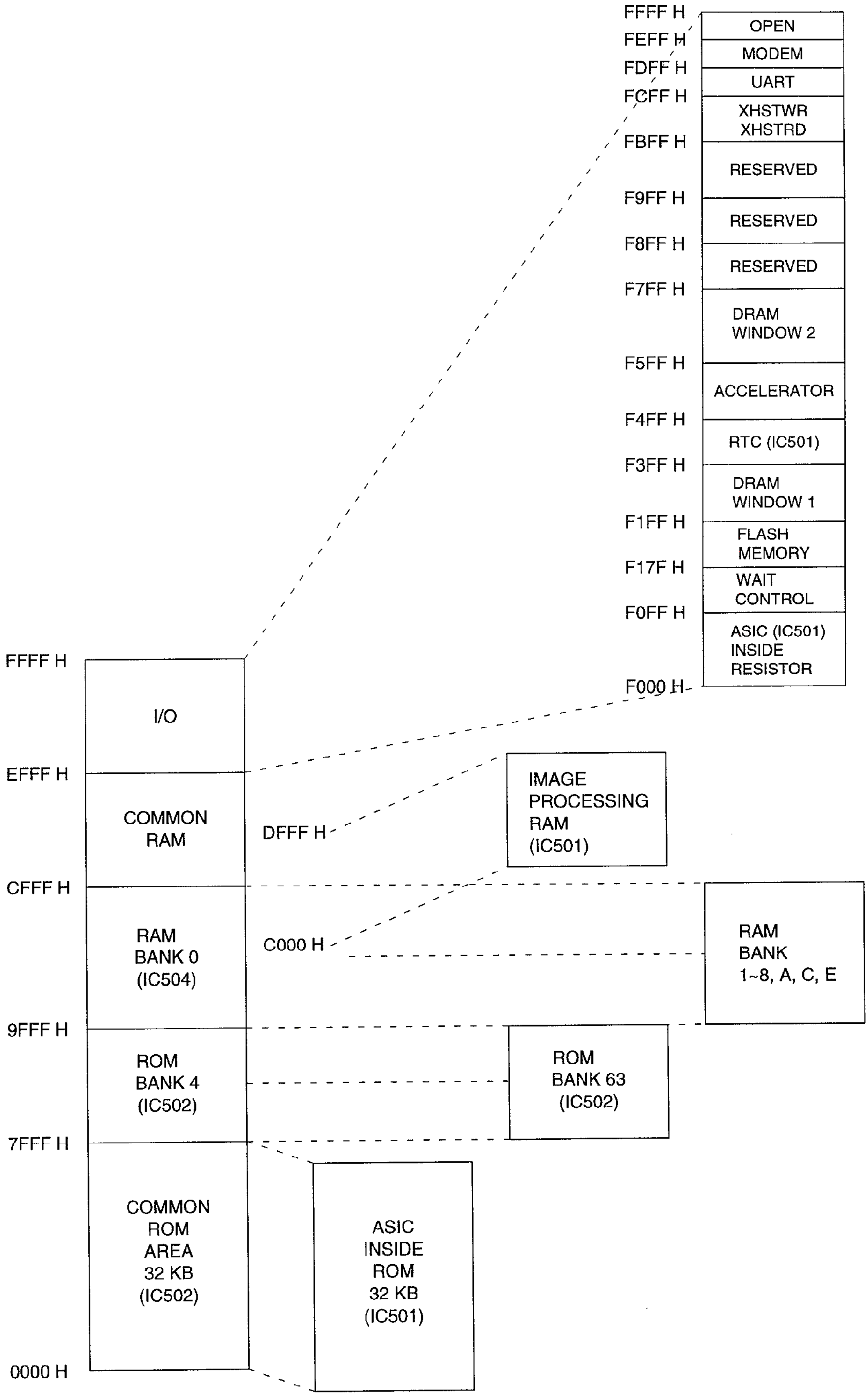
3. CONTROL SECTION

3.1 BLOCK DIAGRAM


CN501, 502, 503
TO ANALOG P. C. B
53.76MHZ
IC505 MODEM
A[4:0]
D[7:0]
XRD
XWR
XCS
SR41N
SR3OUT
CLKIN
RMODE
TMODE
TX
RX
IC514 CODEC
TM, RM
CLK
TXD
RXD
ADR[4:0]
+8V
IN
GND
OUT
+5V
IC513 FLASH MEMORY
D[7:0]
R/B
CS
OE
WE
ALE
CLE
WP
IC504 SRAM (256Kbit)
A[14:0]
D[7:0]
XRD
XWR
XCS
VCC
+3.3V
RBA[2:0]
ADR[11:0]
IC502 ROM (4Mbit)
A[18:0]
D[7:0]
XRD
XCS
RBA[5:0]
ADR[12:0]
RESET(OPE)
+5V
IC503 DRAM (4Mbit)
A[9:0]
D[7:0]
XRD
XWR
XRAS
XCAS
RBA[5:0]
ADR[7:4]
IC509
OUT
GND
IN
+5V
+3.3V
+5V
24MHZ
ASIC (IC501)
ADR[15:13]
RBA[5:0]
ADR[12:0]
DB[7:0]
XRD
XWR
XRAS
XCAS1
XROMCS
XRAMCS
XMDMCS
XWDERR
XRESETI
XORESET
XRESET
XBACKEN
+3V/BATT
+5V/BATT
XHSTRD
XHSTWR
FMEMDO
FMEMDI
FMEMCLK
FMEMCS
CN507
KSTART, KLATCH
KSCLK, KTXD
RESET
KRXD
TO OPERATION PCB
CN506
FTG, F1, F2, FR
VIDEO
TO CCD BLOCK
CN508
THDAT, THCLK, THLAT
STB1, STB2, STB3
TM
TO THERMAL HEAD
CN510, 511
TM[3:0], TXE
PM[3:0], TXE
CCD-LED
TO MOTOR DRIVER PCB
CN505
FILM-END
FILM-LED
TO FILM END
CN504
PTOP
SEN-LED
TO PAPER TOP
+5V
CN512
PDET
+24V, +8V, PG
TO POWER SUPPLY

KX-FP270

3.2 MEMORY MAP


FFFF H
FEFF H
FDFF H
FCFF H
FBFF H
F9FF H
F8FF H
F7FF H
F5FF H
F4FF H
F3FF H
F1FF H
F17F H
F0FF H
F000 H
OPEN
MODEM
UART
XHSTWR
XHSTRD
RESERVED
RESERVED
RESERVED
DRAM WINDOW 2
ACCELERATOR
RTC (IC501)
DRAM WINDOW 1
FLASH MEMORY
WAIT CONTROL
ASIC (IC501) INSIDE RESISTOR
FFFF H
EFFF H
CFFF H
9FFF H
7FFF H
0000 H
I/O
COMMON RAM
RAM BANK 0 (IC504)
ROM BANK 4 (IC502)
COMMON ROM AREA 32 KB (IC502)
DFFF H
C000 H
IMAGE PROCESSING RAM (IC501)
RAM BANK 1~8, A, C, E
ROM BANK 63 (IC502)
ASIC INSIDE ROM 32 KB (IC501)

3.3 ASIC (IC501)

This custom IC is used for general FAX operations.

(1)	CPU:	This model uses a Z80 equivalent CPU operating at 12 MHz. Many of the peripheral functions are handled by custom designed LSIs. As a result, the CPU only needs to process the results.
(2)	RTC:	Real time clock.
(3)	DECODER:	Decodes the address.
(4)	ROM/RAM I/F:	Controls the SELECT signal of ROM or RAM and bank switching.
(5)	CCD I/F:	Controls document reading.
(6)	IMAGE DATA RAM:	This is inside the ASIC and has 8 KB which is used for image processing.
(7)	THERMAL HEAD I/F:	Transmits the recorded data to the thermal head.
(8)	MOTOR I/F:	Controls the transmission motor which feeds the document. Controls the receiving motor which feeds the recording paper.
(9)	OPERATION PANEL I/F:	Serial interface with Operation Panel.
(10)	I/O PORT:	I/O Port Interface.
(11)	ANALOG UNIT:	Electronic volume for the handset and monitor. Sends beep tones, etc.

This memory is built-in to the ASIC (IC501) to be used for image processing.
The memory map of the Image Data RAM is shown below.

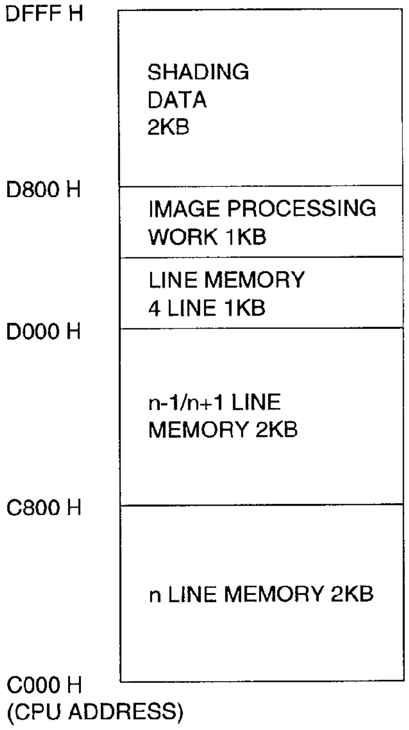

DFFF H
SHADING DATA 2KB
D800 H
IMAGE PROCESSING WORK 1KB
LINE MEMORY 4 LINE 1KB
D000 H
n-1/n+1 LINE MEMORY 2KB
C800 H
n LINE MEMORY 2KB
C000 H
(CPU ADDRESS)

Fig. A

3.4 ROM (IC502)

This 512 KB ROM (EPROM or MASKROM) has 32 KB of common area and bank area (BK4~BK63).
The capacity of each bank is 8 KB.
The addresses of the common area are from 0000H to 7FFFH, and addresses 8000H to 9FFFH are for the bank area.

3.5 STATIC RAM (IC504)

This 32 KB RAM has 8 KB of common area and bank area (BK0~BK8, A, C, E).
The capacity of each bank is 12 KB.
The addresses of the common area are from D000H to EFFFH, and the addresses A000H to CFFFH are for the bank area.

3.6 DYNAMIC RAM (IC503)

The DRAM is used for CPU work and receiving memory.
The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

Explanation of Pin Distribution (IC501)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
1	AIN1	A	3.3V	CCD IMAGE SIGNAL INPUT
2	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
3	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
4	VSSB		GND	POWER SOURCE (ANALOG GND)
5	VDDB		3.3V	POWER SOURCE (ANALOG +3.3V)
6	VDD (3.3V/B)		3.3V/BATT	POWER SOURCE (+3.3V/LITHIUM BATTERY)
7	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
8	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	VSS		GND	GND
10	XBACEN	I	5V/BATT	BACKUP ENABLE
11	VDD (5V/B)		5V/BATT	POWER SOURCE (+5V/LITHIUM BATTERY)
12	XRAMCS	O	5V/BATT	RAM (IC504) CHIP SELECT
13	FTG	O	5V	SH SIGNAL OUTPUT FOR CCD
14	F1	O	5V	01 SIGNAL OUTPUT FOR CCD
15	F2	O	5V	02 SIGNAL OUTPUT FOR CCD
16	FR	O	5V	RS SIGNAL OUTPUT FOR CCD
17	VIDRST	I	5V	INPUT PORT (ESD)
18	SPHCLK	I	5V	INPUT PORT (VOX)
19	DARKON	O	5V	OUTPUT PORT (MODSRX)
20	ADSEL2	I	5V	INPUT PORT (SD)
21	CPC	I	5V	INPUT PORT (DCN)
22	BELL	O	5V	OUTPUT PORT (CCD LED ON)
23	VDD (5V)		5V	POWER SOURCE (+5V)
24	VSS		GND	POWER SOURCE (GND)
25	RVN	I	5V	INPUT PORT (FILM END SENSOR SIGNAL)
26	TXD	O	5V	NOT USED
27	RXD	O	5V	NOT USED
28	XRTS	O	5V	NOT USED
29	XCTS	O	5V	NOT USED
30	XDSR	O	5V	NOT USED
31	DCD	O	5V	NOT USED
32	XDTR	O	5V	NOT USED
33	RI	O	5V	-----------
34	TONE1		5V	TONE OUTPUT
35	TONE2		5V	NOT USED
36	VOL1		5V	NOT USED
37	VOL2		5V	NOT USED
38	VOL3		5V	NOT USED
39	MIDAT	O	5V	ANALOG ASIC I/F (DATA)
40	MICLK	O	5V	ANALOG ASIC I/F (CLK)
41	MILAT	O	5V	ANALOG ASIC I/F (LATCH)
42	XRESCS1	O	5V	OUTPUT PORT (BREAK)
43	XRESCS2	O	5V	OUTPUT PORT (MODEM RESET)
44	VSS		GND	POWER SOURCE (GND)
45	VDD (5V)		5V	POWER SOURCE (+5V)
46	XNMI	I	5V	HIGH FIXED
47	CBUSY2	O	5V	OUTPUT PORT (LINE RLY)
48	CSO	O	5V	OUTPUT PORT (CCD ON)
49	CBUSY1	I	5V	INPUT PORT (JOG1)
50	CCLK	I	5V	INPUT PORT (JOG2)
51	CSI	I	5V	INPUT PORT (VOX)
52	XMDMINT	I	5V	MODEM INTERRUPT
53	XMDMCS	O	5V	MODEM CHIP SELECT

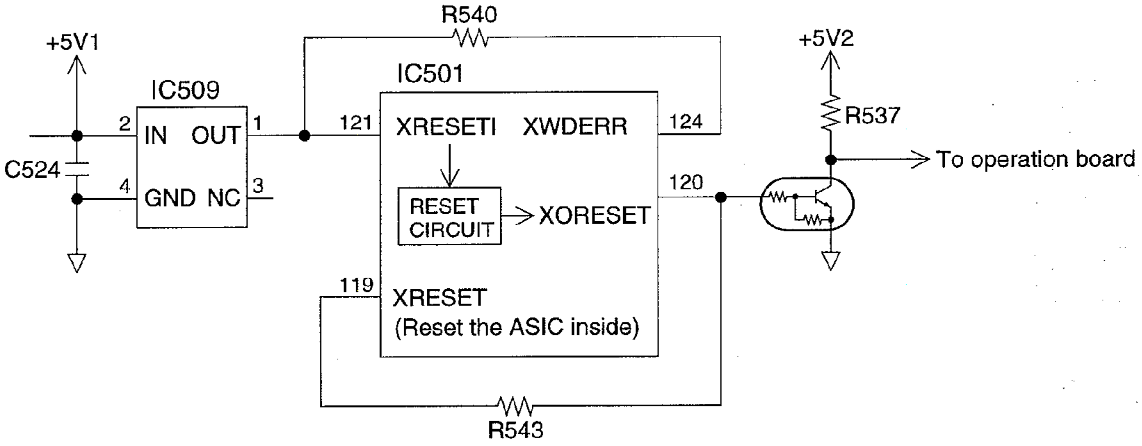
NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
54	XRESCS3	O	5V	OUTPUT PORT (FILM SENSOR LED ON)
55	20KOSC	I/O	5V	NOT USED
56	XHOLDAK	O	5V	NOT USED
57	VDD (3.3V)		3.3V	POWER SOURCE (+3.3V)
58	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
59	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
60	VSS		GND	POWER SOURCE (GND)
61	VDD (5V)		5V	POWER SOURCE (+5V)
62	XTEST	O	5V	24MHz CLOCK
63	CPUCLK	O	5V	NOT USED
64	TEST1	I	5V	HIGH FIXED
65	TEST2	I	5V	HIGH FIXED
66	TEST3	I	5V	HIGH FIXED
67	TEST4	I	5V	HIGH FIXED
68	XWAIT	I	5V	LOW FIXED
69	HOLD	I	5V	LOW FIXED
70	VSS		GND	POWER SOURCE (GND)
71	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
72	HSTRD	O	5V	FLASH MEMORY READ
73	HSTWR	O	5V	FLASH MEMORY WRITE
74	XOPRBE	O	5V	OUTPUT PORT (ACK)
75	ADR15	O	5V	CPU ADDRESS BUS 15 (NOT USED)
76	ADR14	O	5V	CPU ADDRESS BUS 14 (NOT USED)
77	ADR13	O	5V	CPU ADDRESS BUS 13 (NOT USED)
78	XRAS	O	5V	DRAM (IC503) ROW ADDRESS STROBE
79	XCAS1	O	5V	DRAM (IC503) CULUM ADDRESS STROBE
80	XCAS2	O	5V	OUTPUT PORT (PCTL)
81	DB3	I/O	5V	CPU DATA BUS 3
82	DB2	I/O	5V	CPU DATA BUS 2
83	DB4	I/O	5V	CPU DATA BUS 4
84	DB1	I/O	5V	CPU DATA BUS 1
85	DB5	I/O	5V	CPU DATA BUS 5
86	DB0	I/O	5V	CPU DATA BUS 0
87	DB6	I/O	5V	CPU DATA BUS 6
88	DB7	I/O	5V	CPU DATA BUS 7
89	XROMCS	I/O	5V	ROM (IC502) CHIP SELECT
90	VSS		GND	POWER SOURCE (GND)
91	VDD (5V)		5V	POWER SOURCE (+5V)
92	RD	O	5V	CPU RD
93	WR	O	5V	CPU WR
94	ADR0	O	5V	CPU ADDRESS BUS 0
95	ADR1	O	5V	CPU ADDRESS BUS 1
96	ADR2	O	5V	CPU ADDRESS BUS 2
97	ADR3	O	5V	CPU ADDRESS BUS 3
98	ADR4	O	5V	CPU ADDRESS BUS 4
99	ADR5	O	5V	CPU ADDRESS BUS 5
100	ADR6	O	5V	CPU ADDRESS BUS 6
101	ADR7	O	5V	CPU ADDRESS BUS 7
102	ADR8	O	5V	CPU ADDRESS BUS 8
103	ADR9	O	5V	CPU ADDRESS 9
104	ADR10	O	5V	CPU ADDRESS 10
105	ADR11	O	5V	CPU ADDRESS 11
106	ADR12	O	5V	CPU ADDRESS 12

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
107	RBA0	O	5V	ROM/RAM BANK ADDRESS 0
108	VSS		GND	POWER SOURCE (GND)
109	VDD (5V)		5V	POWER SOURCE (+5V)
110	RBA1	O	5V	ROM/RAM BANK ADDRESS 1
111	RBA2	O	5V	ROM/RAM BANK ADDRESS 2
112	RBA3	O	5V	ROM/RAM BANK ADDRESS 3
113	RBA4	O	5V	ROM/RAM BANK ADDRESS 4
114	RBA5	O	5V	ROM/RAM BANK ADDRESS 5
115	FMEMCS	O	5V	OUTPUT PORT (FCS)
116	FMEMDO	O	5V	OUTPUT PORT (ALE)
117	FMEMDI	O	5V	OUTPUT PORT (CLE)
118	FMEMCLK	I	5V	INPUT PORT (R/B)
119	XRESET	I	5V	RESET INPUT
120	XORESET	O	5V	RESET OUTPUT
121	XRESETI	I	5V	RESET INPUT
122	VDD (5V)		5V	POWER SOURCE (+5V)
123	VSS		GND	POWER SOURCE (GND)
124	WDERR	O	5V	WATCHED ERROR OUTPUT SIGNAL
125	IOP	O	5V	THERMAL HEAD POWER ON/OFF CONTROL
126	RM0	O	5V	RECEIVE MOTOR A PHASE
127	RM1	O	5V	RECEIVE MOTOR B PHASE
128	RM2	O	5V	RECEIVE MOTOR /A PHASE
129	RM3	O	5V	RECEIVE MOTOR /B PHASE
130	RXE	O	5V	RECEIVE MOTOR ENABLE SIGNAL
131	TMO	O	5V	TRANSFER MOTOR A PHASE
132	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
133	VSS		GND	POWER SOURCE (GND)
134	TM1	O	5V	TRANSFER MOTOR B PHASE
135	TM2	O	5V	TRANSFER MOTOR /A PHASE
136	TM3	O	5V	TRANSFER MOTOR /B PHASE
137	TXE	O	5V	TRANSFER MOTOR ENABLE SIGNAL
138	STB1	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
139	STB2	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
140	STB3	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
141	STB4	O	5V	NOT USED
142	VDD (5V)		5V	POWER SOURCE (+5V)
143	VSS		GND	POWER SOURCE (GND)
144	STBNP	I	5V	INPUT PORT (CPC)
145	THDAT	O	5V	RECORDED IMAGE OUTPUT
146	THCLK	O	5V	CLOCK OUTPUT FOR DATA TRANSFER
147	THLAT	O	5V	PULSE OUTPUT FOR DATA LATCH
148	KSTART	O	5V	OPERATION PANEL CONTROL
149	KLATCH	O	5V	OPERATION PANEL CONTROL
150	KSCLK	O	5V	OPERATION PANEL CONTROL
151	KTXD	O	5V	OPERATION PANEL CONTROL
152	KRXD	I	5V	OPERATION PANEL CONTROL
153	ADSEL1	O	5V	CHANNEL SELECT SIGNAL FOR AIN2
154	VSSC		GND	POWER SOURCE (ANALOG GND)
155	VDDC		3.3V	POWER SOURCE (ANALOG +3.3V)
156	VSSA		GND	POWER SOURCE (ANALOG GND)
157	VDDA		3.3V	POWER SOURCE (ANALOG +3.3V)
158	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT
159	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
160	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT

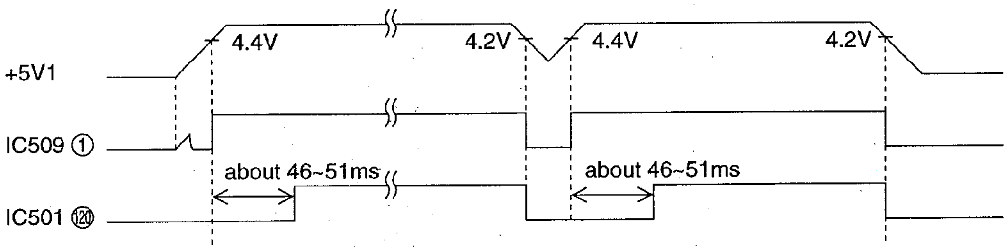
3.8 RESET CIRCUIT (WATCH DOG TIMER)

The output signal from pin 1 of the voltage detect IC (IC509) is input to the ASIC (IC501) 121 pin. Then the output signal from pin 120 of the ASIC (IC501) resets the ASIC, the MODEM (IC505) and the gate array (IC301) on the operation board.

Circuit Diagram


R540
+5V1
IC509
IC501
+5V2
R537
C524
2
IN
OUT
1
121
XRESETI
XWDERR
124
To operation board
4
GND
NC
3
120
RESET CIRCUIT
XORESET
119
XRESET
(Reset the ASIC inside)
R543

(1) During a momentary power interruption, a positive reset pulse of 46~51 msec is generated and the system is reset completely.


4.4V
4.2V
4.4V
4.2V
+5V1
IC509 ①
about 46~51ms
about 46~51ms
IC501 ⑫⓪

(2) When pin 119 and 120 of IC501 become low level, they will prohibit the SRAM (IC503) from changing data. The SRAM (IC504) will go into the backup mode, when they are backed up by a lithium battery.

(3) The watch dog timer, built-in the ASIC (IC501), is initialized by the CPU about every 1.5 ms. When a watch dog error occurs, pin 124 of the ASIC (IC501) becomes low level. The terminal of the $\overline{\text{WDERR}}$ signal is connected to the reset line, so the $\overline{\text{WDERR}}$ signal works as the reset signal.

3.9 SRAM AND RTC BACK UP CIRCUIT

1) Function

This unit has a lithium battery (BATT) which works for the SRAM (IC504) and Real Time Clock IC (RTC: inside IC501).
The user parameters for autodial numbers, the system setup data and so on are stored in the SRAM (IC504).
The RTC continues functioning, even when the power switch is OFF, backed up by a lithium battery.

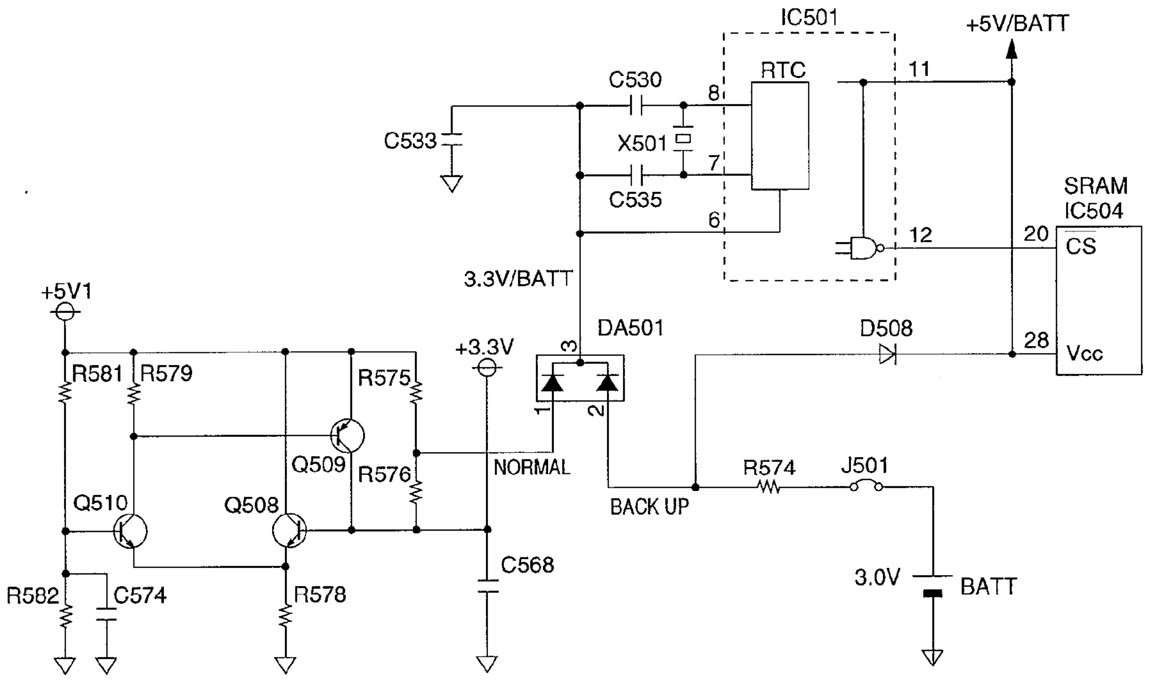
2) SRAM (IC504) Backup Circuit Operation

When the power switch is turned ON, power is supplied through pin 11 of IC501 to the SRAM (IC504). At this time, the voltage at pin 28 of the SRAM is 5V. When the power switch is turned OFF, the BATT supplies power to the SRAM through J501, R574 and D508. The voltage at pin 28 of the SRAM is about +2.5V. When the power switch is OFF and the voltage of +5V decreases, the voltage detect IC (IC509) outputs " Low " level and the IC501 outputs the reset signal. Pin 28 of the SRAM becomes roughly the same voltage as the battery voltage. At this point, pin 20 (CS) of IC504 becomes high level, causing the SRAM to go into the backup mode, in which the power consumption is lower.

3) RTC Inside (IC501) Backup Circuit Operation

When the power switch is turned ON, power is supplied through DA501 to the RTC (inside IC501). At this time, the voltage at pin 6 of the IC501 is +3.3V. When the power switch is turned OFF, the BATT supplies power to RTC through DA501. The voltage at pin 6 of IC501 is about +2.5V. When the power switch is OFF and the voltage of +3.3V decreases, pin 6 of RTC (IC501) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram


IC501
+5V/BATT
C530
RTC
11
8
C533
X501
7
C535
6
12
20
SRAM
IC504
CS
3.3V/BATT
+5V1
DA501
D508
28
Vcc
+3.3V
3
1
2
R581
R579
R575
Q509
R576
NORMAL
R574
J501
Q510
Q508
BACK UP
C568
3.0V
BATT
R582
C574
R578

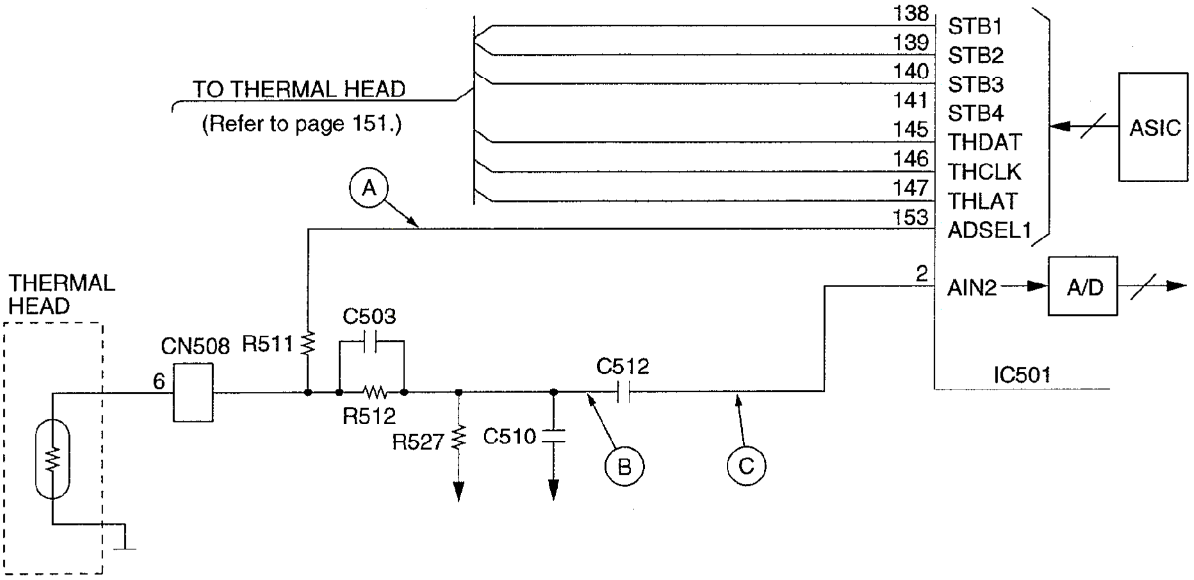
3.10 SUPERVISION CIRCUIT FOR THE THERMAL HEAD TEMPERATURE

1) Function

The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 153 of IC501 becomes a low level. Then when it becomes a high level, it triggers point Ⓐ. In point Ⓒ, according to the voltage output time, the thermal head's temperature is detected.

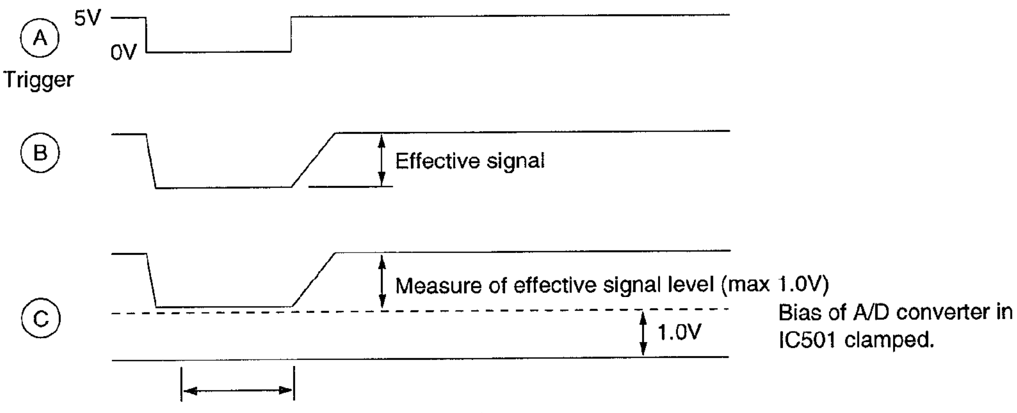
After the thermal head temperature is converted to voltage in Ⓑ, it is then changed to digital data in the A/D converter inside IC501. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



TO THERMAL HEAD
(Refer to page 151.)
138
139
140
141
145
146
147
153
2
STB1
STB2
STB3
STB4
THDAT
THCLK
THLAT
ADSEL1
ASIC
AIN2
A/D
IC501
THERMAL HEAD
CN508
R511
6
C503
R512
R527
C510
C512
A
B
C

Timing Chart

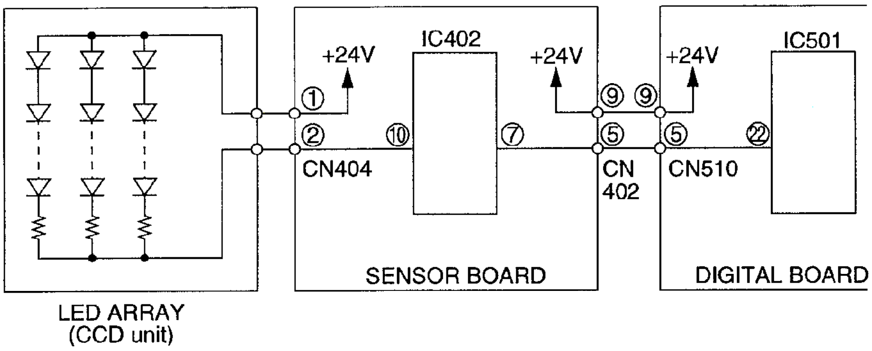


Input (AIN2) reset once to obtain reference.

3.11 LED ARRAY

The LED ARRAY will light during transmission and copying as a light source to recognize document characters, patterns, or graphics on a document. Pin 22 of IC501 is low level while the LED array is lit.
It is also possible to light the LED ARRAY in the test mode (SCAN CHECK: Refer to page 105.).

Circuit Diagram



4. FACSIMILE SECTION

4.1 IMAGE DATA FLOW DURING FACSIMILE OPERATION

COPY (Fine, Super-Fine, Half Tone)

1) White plate information is read by the CCD (to be used as the reference white level) via route ①, and the result is input to IC501. Refer to the block diagram on the following page.
2) In IC501, the data is adjusted to a suitable level for A/D conversion in the Analog Signal Processing Section, and via route ② it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route ③. Then via routes ④ and ⑤, it is stored in RAM as shading data.
3) The draft's information that is read by CCD is input to IC501 via route ①. After adjusting it to a suitable level for A/D conversion via route ②, the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via routes ⑥ and ⑦, is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Via routes ④ and ⑤, they are stored in RAM.
4) The white/black data stored as above via routes ⑥ and ⑧, is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route ⑨ and is printed out on recording paper.

Note:

	Standard :	Reads 3.58 times/mm
	Fine :	Reads 7.7 times/mm
	Super-Fine :	Reads 15.4 times/mm

Transmission

1) Same processing as **COPY** items 1) - 3).
2) The data stored in the RAM of IC501 is output from IC501 via routes ⑥ and ⑩, and is stored in the system bus. Via route ⑪, it is stored in the communication buffer inside DRAM (IC503).
3) While retreiving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route ⑫, where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

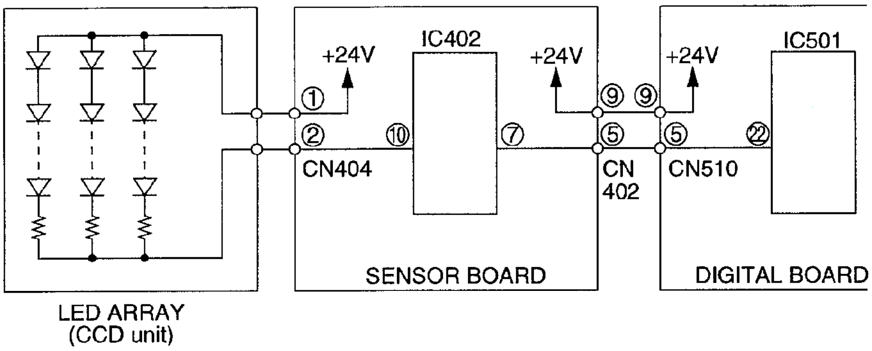
Reception

1) The serial analog image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route ⑫.
2) The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route ⑫, and is stored in DRAM (IC503) via routes ⑬ and ⑤.
3) Same processing as **COPY** item 4).

3.11 LED ARRAY

The LED ARRAY will light during transmission and copying as a light source to recognize document characters, patterns, or graphics on a document. Pin 22 of IC501 is low level while the LED array is lit.
It is also possible to light the LED ARRAY in the test mode (SCAN CHECK: Refer to page 105.).

Circuit Diagram



4. FACSIMILE SECTION

4.1 IMAGE DATA FLOW DURING FACSIMILE OPERATION

COPY (Fine, Super-Fine, Half Tone)

1) White plate information is read by the CCD (to be used as the reference white level) via route ①, and the result is input to IC501. Refer to the block diagram on the following page.
2) In IC501, the data is adjusted to a suitable level for A/D conversion in the Analog Signal Processing Section, and via route ② it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route ③. Then via routes ④ and ⑤, it is stored in RAM as shading data.
3) The draft's information that is read by CCD is input to IC501 via route ①. After adjusting it to a suitable level for A/D conversion via route ②, the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via routes ⑥ and ⑦, is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Via routes ④ and ⑤, they are stored in RAM.
4) The white/black data stored as above via routes ⑥ and ⑧, is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route ⑨ and is printed out on recording paper.

Note:	Standard :	Reads 3.58 times/mm
	Fine :	Reads 7.7 times/mm
	Super-Fine :	Reads 15.4 times/mm

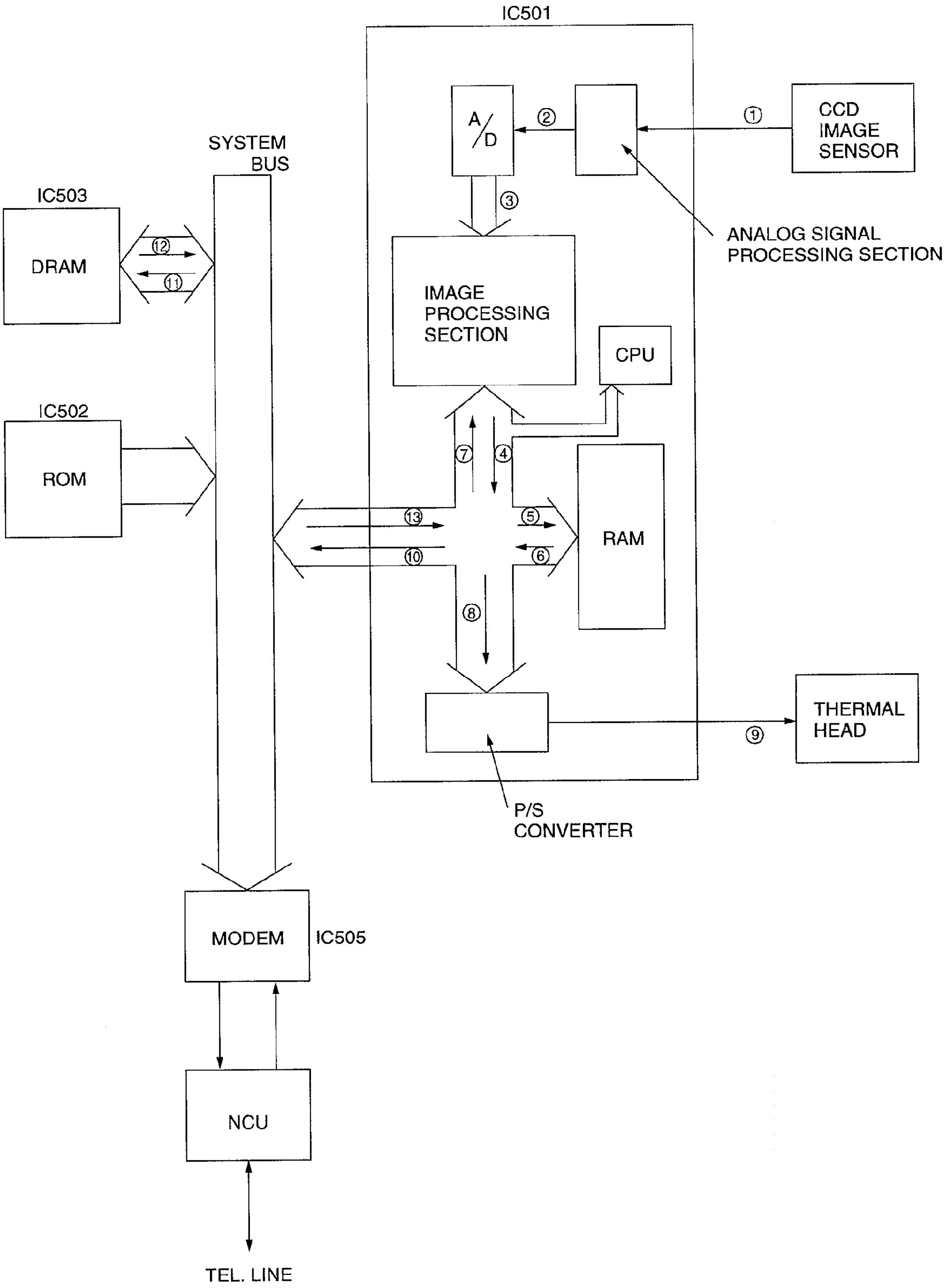
Transmission

1) Same processing as **COPY** items 1) - 3).
2) The data stored in the RAM of IC501 is output from IC501 via routes ⑥ and ⑩, and is stored in the system bus. Via route ⑪, it is stored in the communication buffer inside DRAM (IC503).
3) While retreiving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route ⑫, where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

Reception

1) The serial analog image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route ⑫.
2) The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route ⑫, and is stored in DRAM (IC503) via routes ⑬ and ⑤.
3) Same processing as **COPY** item 4).

Block Diagram

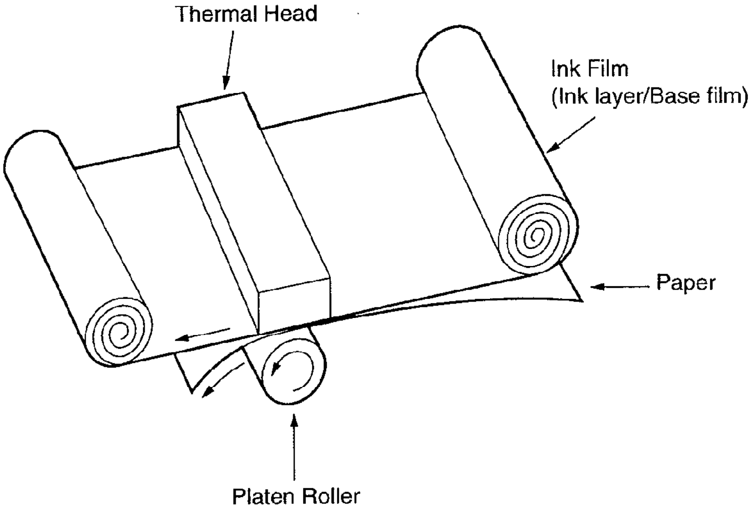

IC501
A/D
②
①
CCD IMAGE SENSOR
SYSTEM BUS
IC503
DRAM
⑫
⑪
③
ANALOG SIGNAL PROCESSING SECTION
IMAGE PROCESSING SECTION
CPU
IC502
ROM
⑦
④
⑬
⑤
RAM
⑩
⑥
⑧
THERMAL HEAD
⑨
P/S CONVERTER
MODEM
IC505
NCU
TEL. LINE

4.2 THERMAL HEAD

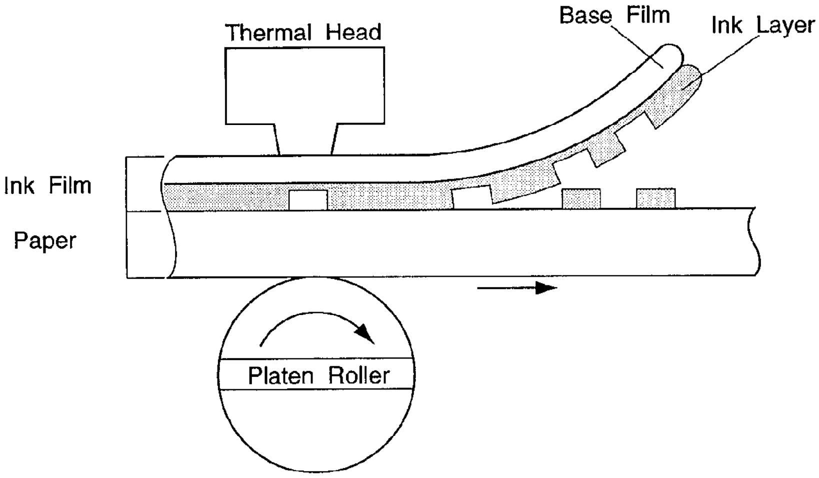
1) Function

This unit utilizes state of the art thermal printer technology.
The ink film is chemically processed. The ink film is comprised of two parts: an ink layer and a base film. When the thermal head contacts this ink film, it emits heat momentarily, and the ink layer is melted and transferred to the paper. If this continues, letters and/or diagrams appear, and the original document is reproduced.

COMPOSITION OF THE RECEIVE RECORD SECTION (THERMAL RECORDING FORMAT)



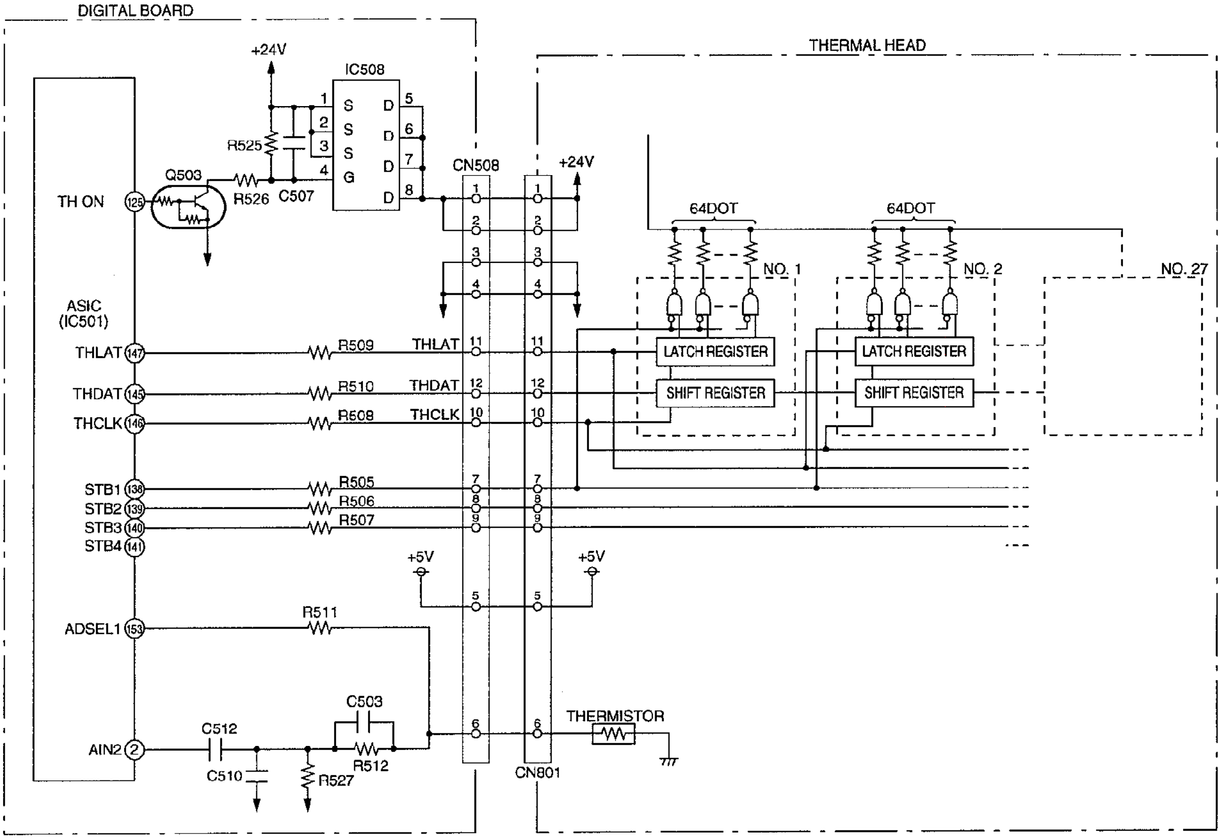
Thermal Transfer



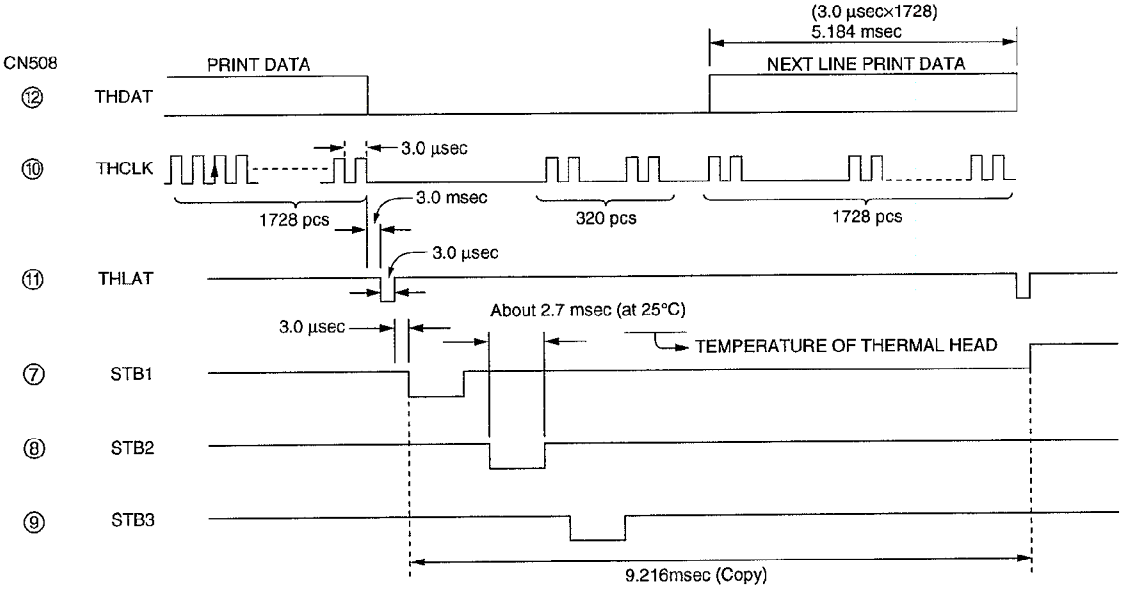
2) Circuit Operation

Refer to the block diagram and the timing chart on the following page.
There are 27 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 64 heat emitting registers. This means that one line is at a density of 64X27=1728 dots=(8 dots/mm).
White/Black (white=0, black=1) data in one line increments is synchronized at IC501 pin 146 (THCLK), and sent from IC501 pin 145 (THDAT) to the shift register of the ICs. The shift registers of the 27 ICs are connected in series, and upon the shift of the 1728 dot increment, the shift register becomes filled with data, and a latch pulse is emitted to each IC from IC501 pin 147 (THLAT). With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC501 pins (138, 139, 140), only the dot location of black (=1) among latched data activates the driver, and the current passes to heat the emitting body to cause heat emission.
Here, the three line strobes, STB1 to STB3, impress at intervals of 9.216 msec ,as required for one-line printout.
The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected according to IC501 pin 2. Depending on that value, the strobe width is recorded in ROM (IC502). Accordingly, the strobe width is determined.]
When the thermal head is not used, the IC501 (125, THON) becomes low , Q503 turns OFF, IC508 turns OFF, and the +24V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram


DIGITAL BOARD
THERMAL HEAD
+24V
IC508
S
S
S
G
D
D
D
D
R525
Q503
R526
C507
CN508
TH ON
ASIC
(IC501)
THLAT
THDAT
THCLK
STB1
STB2
STB3
STB4
ADSEL1
AIN2
R509
R510
R508
R505
R506
R507
R511
C503
C512
R512
C510
R527
+5V
64DOT
64DOT
NO. 1
NO. 2
NO. 27
LATCH REGISTER
LATCH REGISTER
SHIFT REGISTER
SHIFT REGISTER
THERMISTOR
CN801

Timing Chart


(3.0 µsec×1728)
5.184 msec
CN508
PRINT DATA
NEXT LINE PRINT DATA
⑫ THDAT
⑩ THCLK
3.0 µsec
1728 pcs
3.0 msec
320 pcs
1728 pcs
⑪ THLAT
3.0 µsec
About 2.7 msec (at 25°C)
3.0 µsec
TEMPERATURE OF THERMAL HEAD
⑦ STB1
⑧ STB2
⑨ STB3
9.216msec (Copy)

4.3 READ SECTION

1) Function

- A document is illuminated by the LED array, and the reflections pass through the reduction-projection lens and are imaged on the CCD image sensor.
- The document image is photoelectrically transferred by the CCD image sensor, and an analog image signal corresponding to one line of the document is output continuously.
- The analog image signal enters the image signal processing circuit in ASIC (IC501) and then is converted into digital data.

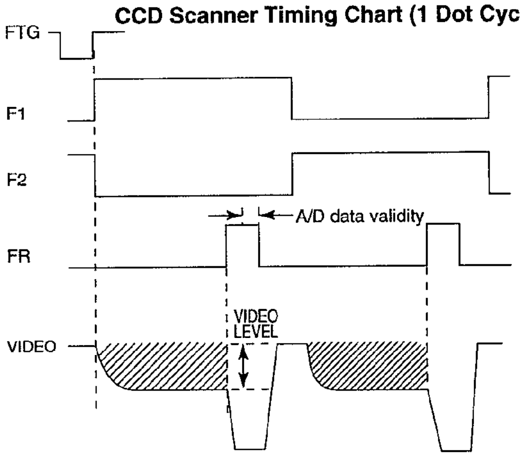
2) Circuit Operation

[Start]

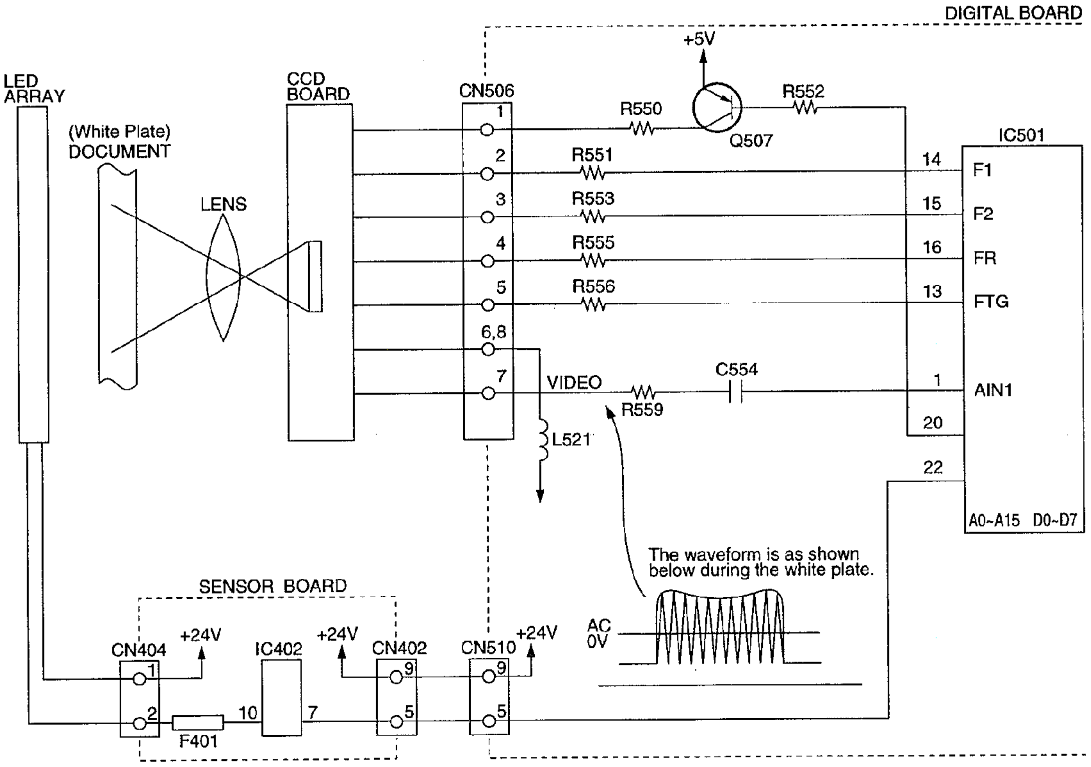
When the START/COPY button is pressed, pin 48 of IC501 goes to a low level and Q507 is turned ON. This makes pin 22 of IC501 a high level and the voltage applied to the LED array turns on the LED.

F1, F2, FR and FTG signals are output to the CCD board to drive the CCD image sensor. Therefore, when the LED is turned ON, the VIDEO (analog image signal) is output from the CCD board to pin 7 of CN506.

CCD Scanner Timing Chart (1 Dot Cycle)



Block Diagram


DIGITAL BOARD
+5V
LED ARRAY
CCD BOARD
CN506
R550
R552
Q507
(White Plate) DOCUMENT
LENS
IC501
1
2
3
4
5
6,8
7
R551
R553
R555
R556
14
15
16
13
F1
F2
FR
FTG
VIDEO
C554
R559
1
20
22
AIN1
L521
A0~A15 D0~D7
The waveform is as shown below during the white plate.
SENSOR BOARD
CN404
+24V
IC402
+24V
CN402
CN510
+24V
AC
0V
1
2
10
7
9
5
9
5
F401

4.4 STEPPING MOTOR DRIVE CIRCUIT

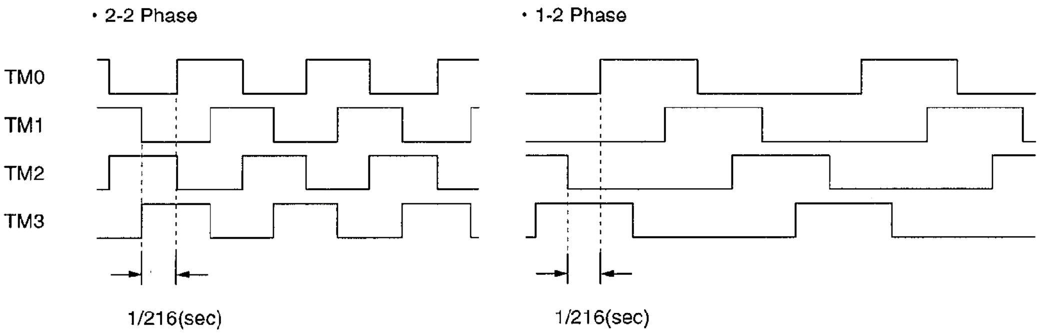
1) Function

Two individual stepping motors are used for transmission and reception. They feed the document or recording paper synchronized for reading or printing.

2) TX Motor

During motor driving, pin 137 of ASIC IC501 becomes a high level, driver pin 12 of IC402 becomes a low level, and Q402 turns ON. As a result, +24V is supplied to the motor coil.
Stepping pulses are output from gate array IC501 pins, 131,134~136, causing driver IC402 pins, 16~13 to drive the TX Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.
The timing chart is below.

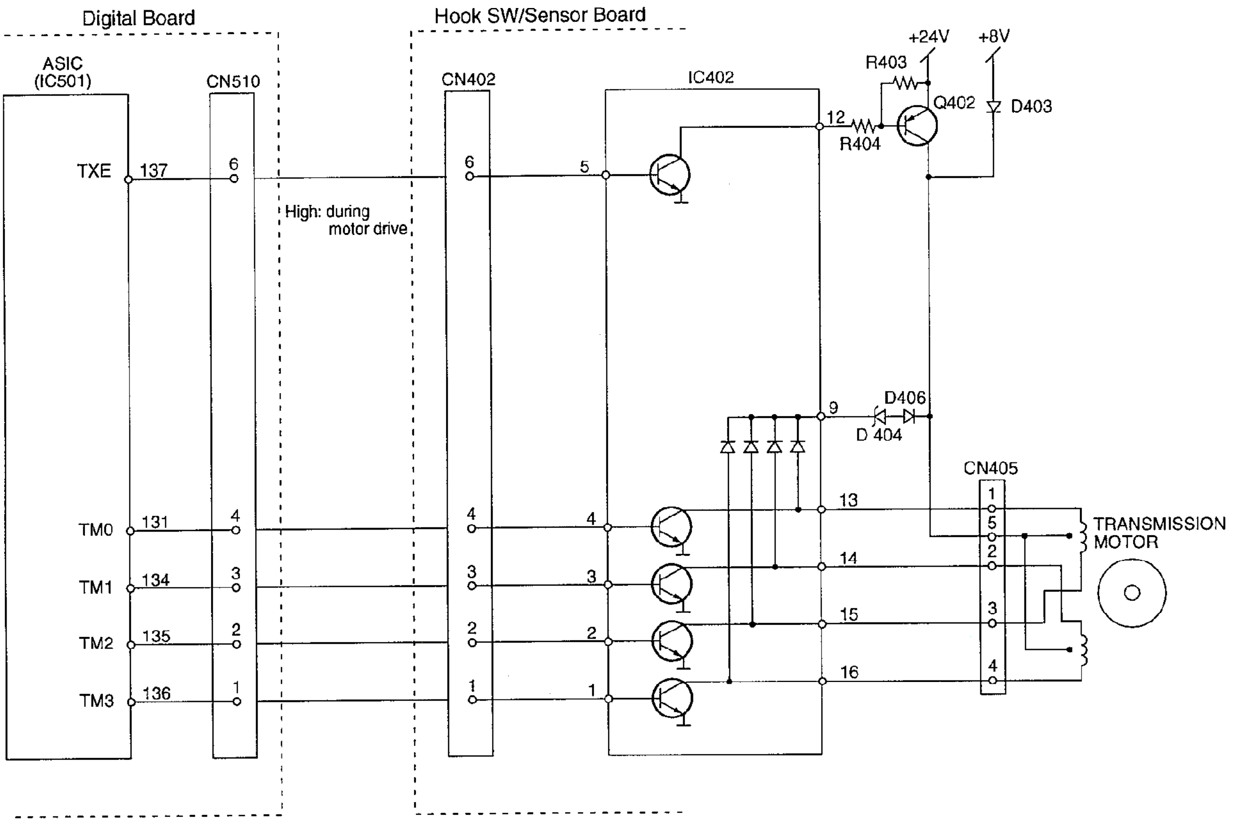
Stepping Motor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	216 pps
FAX	Standard	2-2	216 pps
	Fine or Half tone	1-2	216 pps
Paper Feed	——	2-2	216 pps
Stand-by	——	All phases are currently off.	None

Circuit Diagram


Digital Board
ASIC (IC501)
CN510
TXE
137
6
High: during motor drive
Hook SW/Sensor Board
CN402
IC402
+24V
+8V
R403
Q402
D403
12
R404
5
9
D406
D404
CN405
13
14
15
16
TRANSMISSION MOTOR
TM0
131
4
TM1
134
3
TM2
135
2
TM3
136
1

When the motor is stopped for a period (about 70~80 msec) during the receive mode, pin 137 of ASIC IC501 becomes a low level and driver IC402 pin 13 becomes a high level. This causes Q402 to also turn OFF, and instead of +24 V, +8 V is supplied through D403 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors are OFF. Therefore the motor current is OFF.

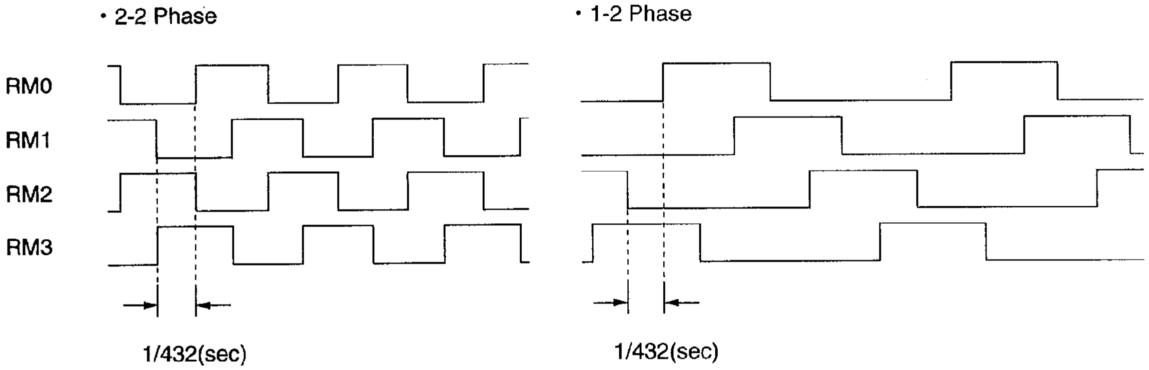
3) RX Motor

During motor driving, pin 130 of ASIC IC501 becomes a high level, driver IC401 pin 14 becomes a low level, and Q401 turns ON. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from ASIC IC501 pins, 126~129, causing driver IC401 pins, 13~10 to drive the RX Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.

The timing chart is below.

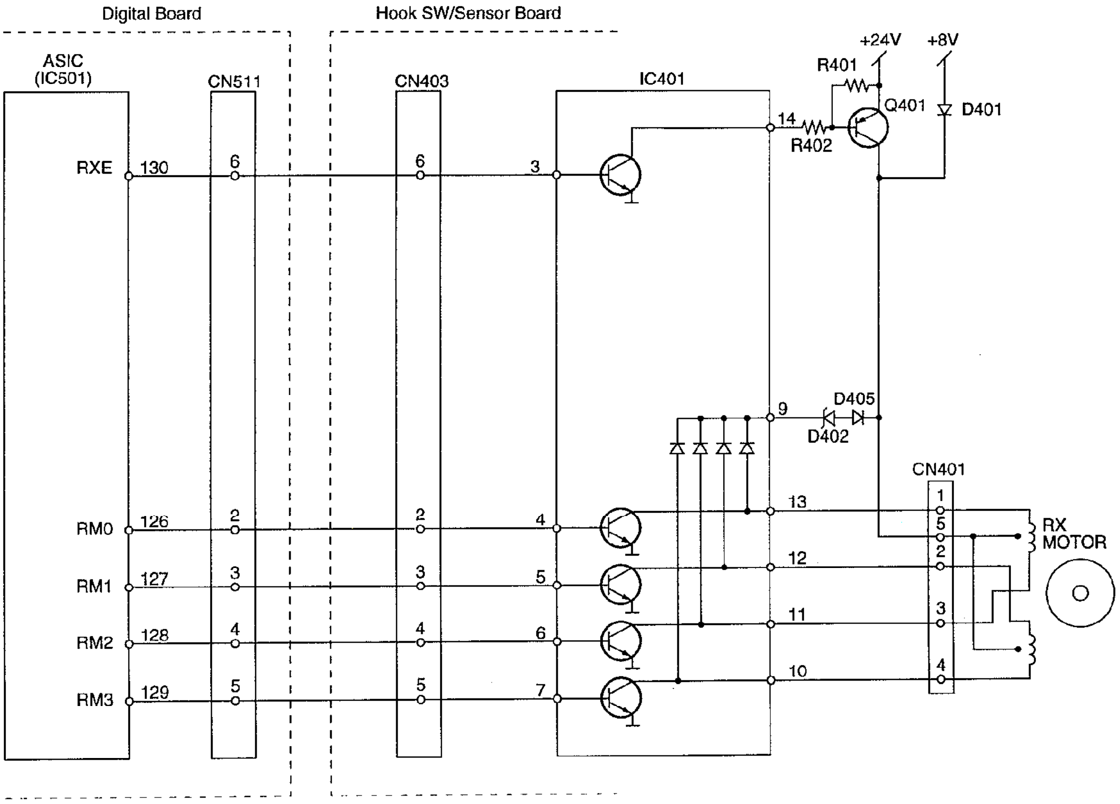
Stepping Motor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	432 pps
FAX	Standard	1-2	432 pps
	Fine or Half tone	1-2	432 pps
Paper Feed	———	1-2	432 pps
Stand-by	———	All phases are currently off.	None

Circuit Diagram


Digital Board
Hook SW/Sensor Board
ASIC
(IC501)
CN511
CN403
IC401
+24V
+8V
R401
Q401
D401
14
R402
RXE
130
6
6
3
9
D405
D402
CN401
RM0
126
2
2
4
13
1
5
2
RX
MOTOR
RM1
127
3
3
5
12
3
RM2
128
4
4
6
11
RM3
129
5
5
7
10
4

When the motor is stopped for a period (about 70~80 msec) during the receive mode, pin 130 of ASIC IC501 becomes a low level and driver IC401 pin 14 becomes a high level. This causes Q401 to also turn OFF, and instead of +24V, +8V is supplied through D401 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors are OFF. Therefore the motor current is OFF.

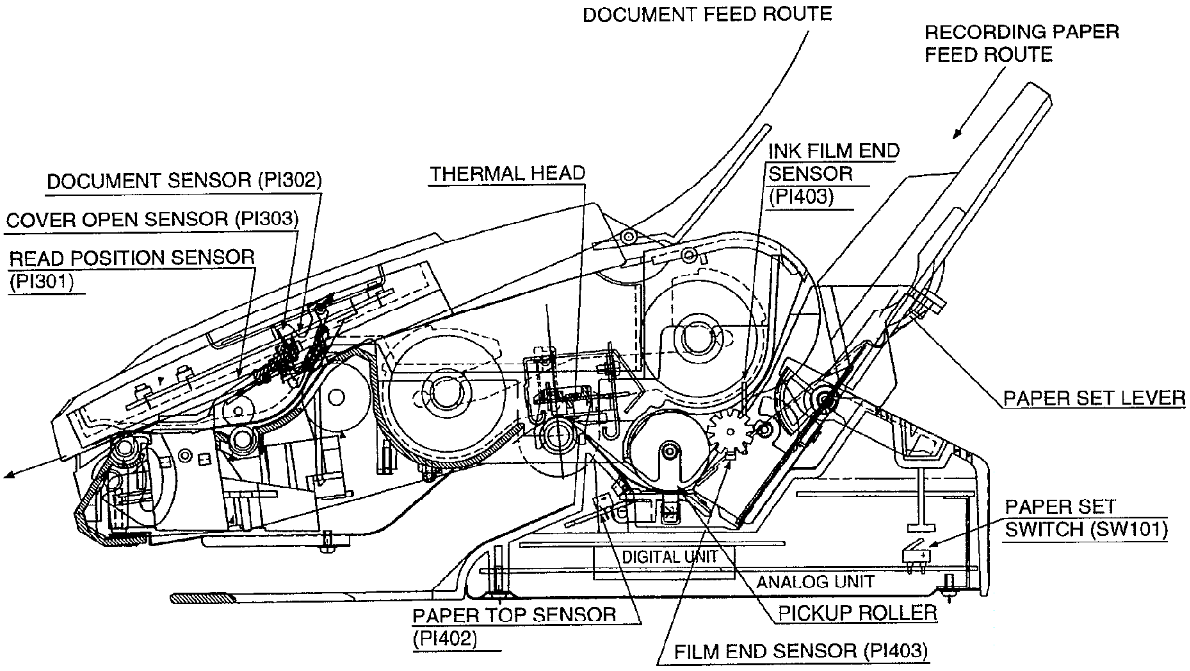
4.5 SENSORS AND SWITCHES

All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Message Error
Operation Panel	PI301	Document Read Position	「REMOVE DOCUMENT」
	PI302	Document	「CHECK DOCUMENT」
	PI303	Cover Open	「CHECK COVER」
Digital PCB & Analog PCB & Sensor PCB	SW401	Hook	————
	SW101	Paper Set	「CHECK LEVER」
	PI402	Paper Top	「PAPER JAMMED」
	PI403	Film End	「FILM EMPTY」

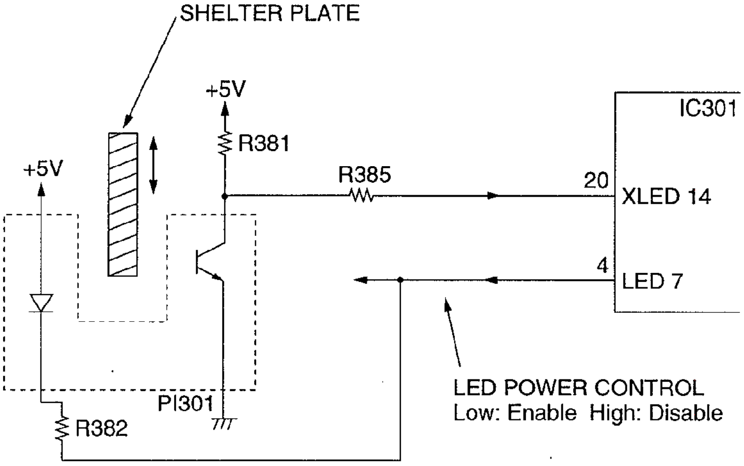
※ See the TEST FUNCTION - SENSOR CHECK SECTION for the sensor test.
(#815 of Service Mode test. Refer to page 106.)

Sensor Locations


DOCUMENT FEED ROUTE
RECORDING PAPER FEED ROUTE
DOCUMENT SENSOR (PI302)
THERMAL HEAD
INK FILM END SENSOR (PI403)
COVER OPEN SENSOR (PI303)
READ POSITION SENSOR (PI301)
PAPER SET LEVER
PAPER SET SWITCH (SW101)
DIGITAL UNIT
ANALOG UNIT
PICKUP ROLLER
PAPER TOP SENSOR (PI402)
FILM END SENSOR (PI403)

①[Read Position Sensor (PI301)]

The sensor detects the front edge of the document.
When a document is brought to the read position, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC301-20 pin (Operation) becomes a low level. When there is no document at the read position, the shelter plate closes the sensor light, the phototransistor turns OFF, and the input signal of IC301-20 pin (Operation) becomes a high level.

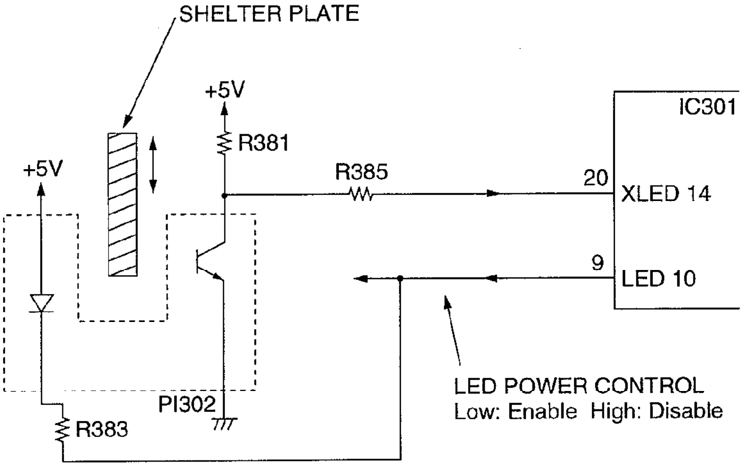

SHELTER PLATE
+5V
R381
+5V
R385
IC301
20
XLED 14
4
LED 7
PI301
R382
LED POWER CONTROL
Low: Enable High: Disable

Operation Board

	Phototransistor	Signal (IC301-20 pin)
Non Read Position	OFF	High level
Read Position	ON	Low level

②[Document Sensor (PI302)]

The sensor detects whether or not a document is in place.
When a document is detected, the shelter plate closes the sensor light, the phototransistor turns OFF, and the input signal of IC301-20 pin (Operation) becomes a high level. When there is no document, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC301-20 pin (Operation) becomes a low level.

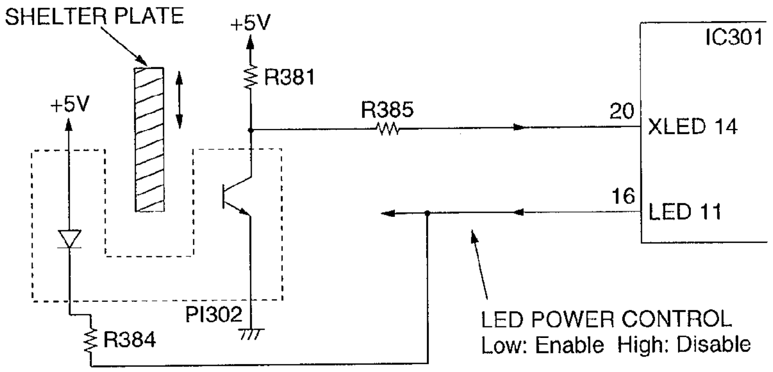

SHELTER PLATE
+5V
R381
+5V
R385
IC301
20
XLED 14
9
LED 10
PI302
R383
LED POWER CONTROL
Low: Enable High: Disable

Operation Board

	Phototransistor	Signal (IC301-20 pin)
No Document	ON	Low level
Document Set	OFF	High level

③[Cover Open Sensor (PI303)]

The sensor detects whether the front cover is open or closed.
When the operation panel cover is closed, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC301-20 pin (Operation) becomes a low level. When the cover is opened, the shelter plate closes the sensor light, the phototransistor turns OFF, and the input signal of IC301-20 pin (Operation) becomes a high level.

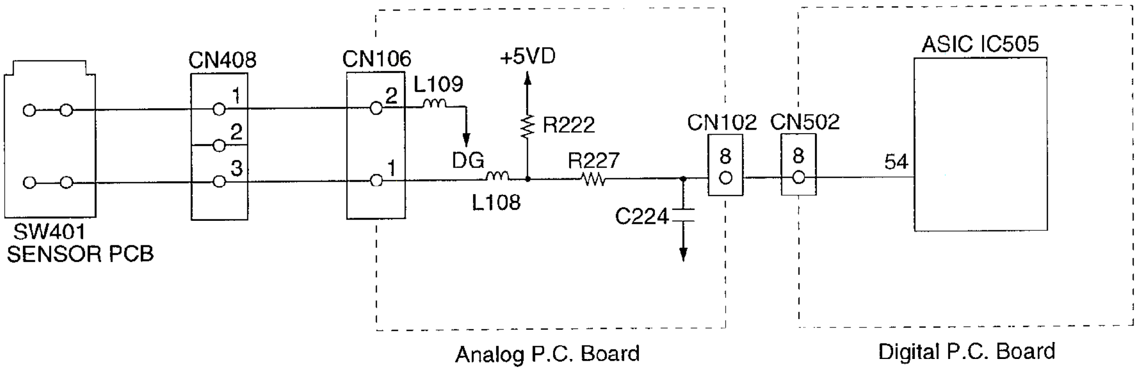

SHELTER PLATE
+5V
R381
+5V
R385
IC301
20
XLED 14
16
LED 11
PI302
R384
LED POWER CONTROL
Low: Enable High: Disable

Operation Board

	Phototransistor	Signal (IC301-20 pin)
Open	ON	Low level
Closed	OFF	High level

④[Hook Switch (SW401)]

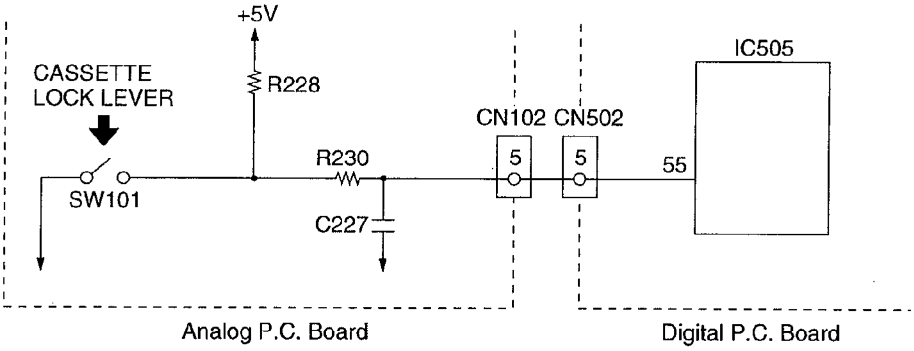
When the handset is raised, the switch is turned ON, and the signal at pin 54 of IC505 is low.
When the handset is returned, the switch is turned OFF, and the signal at pin 54 of IC505 is high.


CN408
1
2
3
CN106
2
1
L109
+5VD
R222
DG
L108
R227
C224
CN102
8
CN502
8
54
ASIC IC505
SW401
SENSOR PCB
Analog P.C. Board
Digital P.C. Board

	SW	Signal (IC505-54 pin)
ON-Hook	Release	Low level
OFF-Hook	Push	High level

⑤[Paper Set Switch (SW101)]

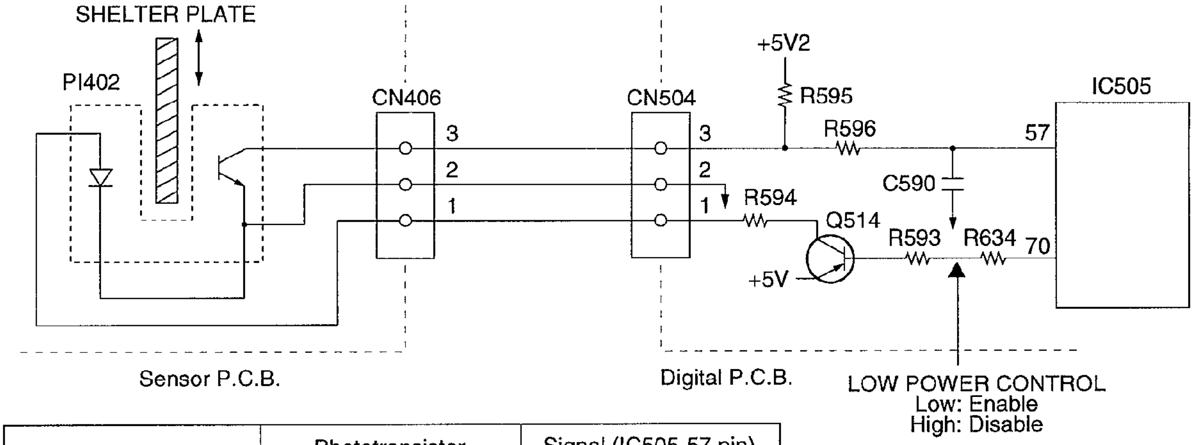
The sensor detects whether or not the cassette lock lever is in place.
When the recording paper is installed and the CASSETTE LOCK LEVER is pulled toward you, the plate is separated from the switch lever, causing the signal at pin 55 of IC505 to be high.
When the recording paper is installed and the CASSETTE LOCK LEVER is pushed back, the plate presses down on the switch lever, causing the signal at pin 55 of IC505 to be low.


+5V
CASSETTE LOCK LEVER
R228
IC505
CN102
CN502
R230
5
5
55
SW101
C227
Analog P.C. Board
Digital P.C. Board

	SW101	Signal (IC505-55 pin)
Set the cassette lock lever	ON	Low level
Release the cassette lock lever	OFF	High level

⑥[Paper top Sensor (PI402)]

The sensor detects whether or not recording paper is present so that printing can start.
When the recording paper is loaded on the print head, the shelter plate shuts the sensor light, and the phototransistor turns OFF. The input signal of IC505-57 pin becomes a high level. Usually, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC505-57 pin becomes a low level.


SHELTER PLATE
PI402
CN406
CN504
+5V2
R595
IC505
3
2
1
3
2
1
R596
57
C590
R594
Q514
R593
R634
70
+5V
Sensor P.C.B.
Digital P.C.B.
LOW POWER CONTROL
Low: Enable
High: Disable

	Phototransistor	Signal (IC505-57 pin)
Recording Paper Set	OFF	High level
No Recording Paper	ON	Low level

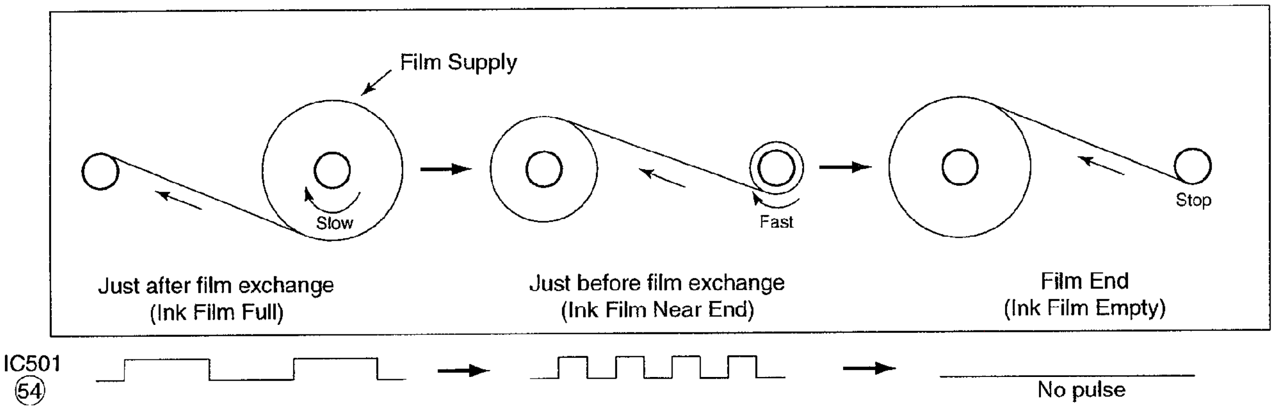
The Interrupt Sensor PI402 LED current is controlled by the IC505-70 pin.

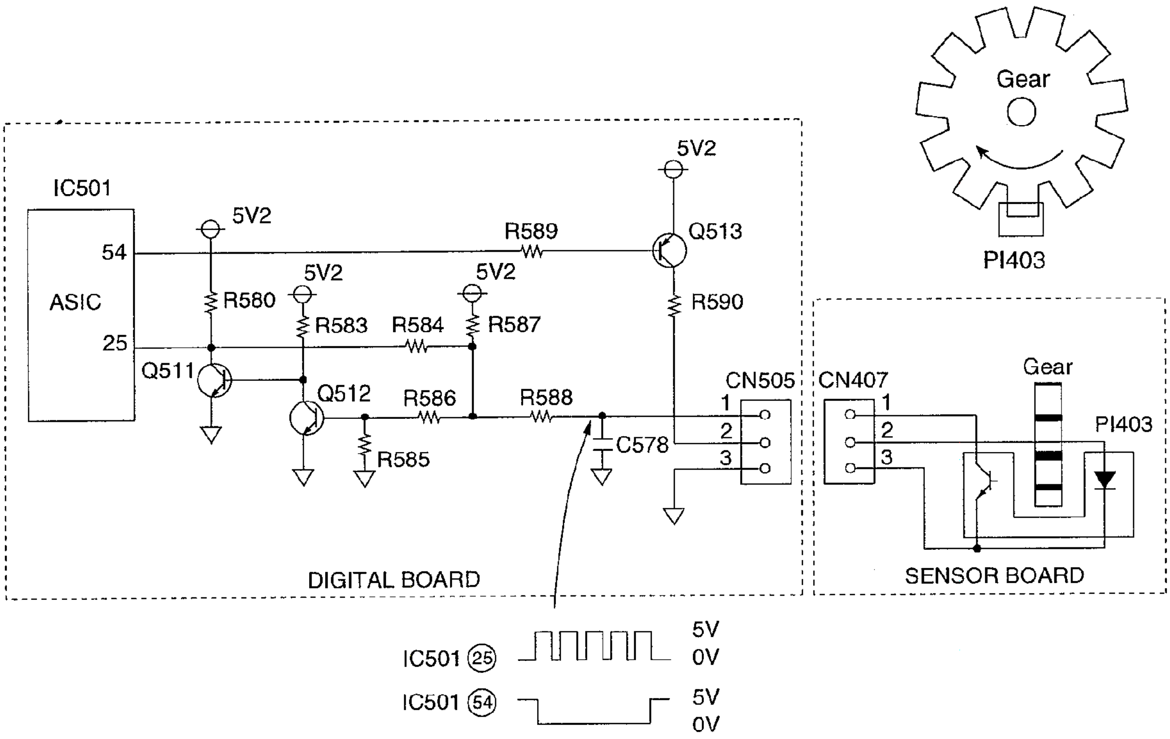
⑦[Film End Sensor (PI403)]

The sensor detects when the ink film has been used up.
As film is used, the revolving speed of the rolled film becomes faster.
In addition, when the film is used up, it comes off of the paper roll.

The remaining film is checked by the revolving speed.
After the film stops turning, the film end is checked.

The rotary encoder rotates slowly when the ink film is full (when printing), as shown in the diagram below. It rotates faster when it is near it's end. Sensor PI403 converts the rotation of the rotary encoder into pulses and the amount of ink film remaining is then calculated internally by the ASIC (IC501) and stored into memory. Then this causes an error such as "Film empty" or "Film near empty" to appear on the LCD display.


Film Supply
Slow
Fast
Stop
Just after film exchange
(Ink Film Full)
Just before film exchange
(Ink Film Near End)
Film End
(Ink Film Empty)
IC501
(54)
No pulse


Gear
PI403
IC501
ASIC
54
25
5V2
R580
Q511
R583
R584
R587
R589
Q512
R586
R588
R585
C578
Q513
R590
CN505
1
2
3
DIGITAL BOARD
CN407
1
2
3
Gear
PI403
SENSOR BOARD
IC501 (25)
5V
0V
IC501 (54)
5V
0V

5. MODEM SECTION

5.1 FUNCTION

The unit uses a 1 chip modem (IC505), enabling it to act as an interface between the control section for FAX sending and receiving, and the telephone line. During a sending operation, the digital image signals are modulated and sent to the telephone line. During a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by CCITT. This 1 chip modem (IC505) has hardware which sends and detects all of the necessary signals for FAX communication.
It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505).
This modem (IC505) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

Overview of Facsimile Communication Procedures (CCITT Recommendation):

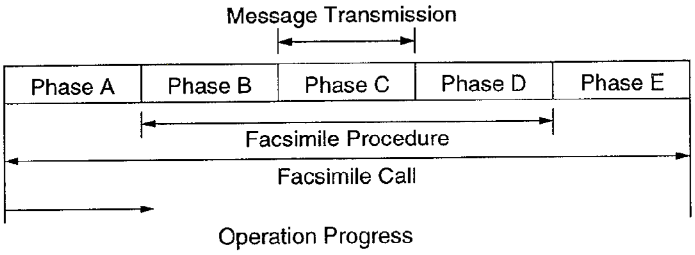
1) ON CCITT (International Telegraph and Telephone Consultative Committee)
The No. XIV Group of CCITT, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

2) Definition of Each Group

- Group Ⅰ (G1)
  Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines.
  Determined in 1968.
  Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.
- Group Ⅱ (G2)
  Using reduction technology in the modulation/demodulation format, an A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.
  Methods to suppress redundancy are not used.
  Determined in 1976.
- Group Ⅲ (G3)
  Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.
  Determined in 1980.
- Group Ⅳ (G4)
  Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.
  The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3) Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A: Call setting
Call setting can be manual/automatic.
Phase B: Pre-message procedure
Phase B is a pre-processing procedure and sequence for the confirming the status of the terminal, transmission route, etc., and for terminal control. It executes terminal preparation status, determines and displays terminal constants, confirms synchronization status, prepares for transmission of facsimile messages, etc.
Phase C: Message transmission
Phase C is the procedure for the transmission of facsimile messages.
Phase D: Post message procedure
Phase D is the procedure for confirming that the message is completed and received. In the case of continuous transmission, phase B or phase C are repeated for transmission.
Phase E: Call retrieval
Phase E is the procedure for call retrieval, that is for circuit disconnection.

4) Concerning Transmission Time

Transmission Time = Control Time + Image Transmission Time + Hold Time

Transmission time consists of the following.

Control time : This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:
This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

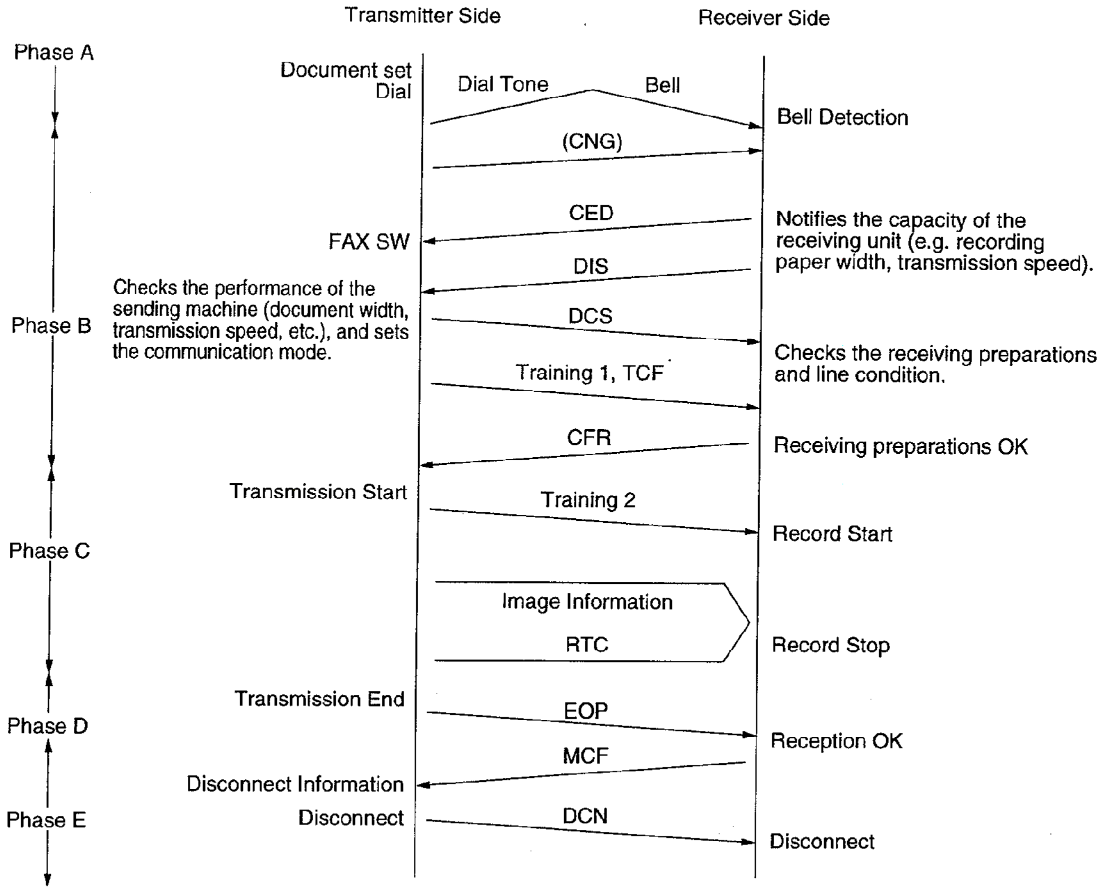
Hold time: This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/or the existence of continuous transmission.

5) Facsimile Standards

	Telephone Network Facsimile
Item	G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (Control Signal) 2400, 4800, 7200, 9600, 12000, 14400 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension : MH Mode 2 dimension : MR Mode (K=2.4)
Resolution	Main Scan : 8 pel/mm Sub Scan : 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on the degree of data reduction. Minimum Value : 10, 20 Can be recognized in 40ms.

6) Explanation of Technology

(1) G3 Communication Signals (T. 30 Binary Process)
For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals.


Transmitter Side
Receiver Side
Phase A
Document set
Dial
Dial Tone
Bell
Bell Detection
(CNG)
CED
FAX SW
Notifies the capacity of the receiving unit (e.g. recording paper width, transmission speed).
DIS
Checks the performance of the sending machine (document width, transmission speed, etc.), and sets the communication mode.
Phase B
DCS
Checks the receiving preparations and line condition.
Training 1, TCF
CFR
Receiving preparations OK
Transmission Start
Training 2
Record Start
Phase C
Image Information
RTC
Record Stop
Transmission End
Phase D
EOP
Reception OK
MCF
Disconnect Information
Phase E
Disconnect
DCN
Disconnect

Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1.
An example of a binary process in G3 communication is shown below.
Explanation of Signals
Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)
Identification Signal Format.....00000001

Function:
Notifies the capacity of the receiving unit.
The added data signals are as follows.

(Example)
Signal.....DCS (Digital Command Signal)
Identification Signal Format.....X1000001
(Example)

Note: Some models do not support the following items.

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	Reserved for future T.3 operation features	

Bit No.	DIS/DTC	DCS
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11, 12, 13, 14	Data signaling rate	Data signaling rate
0, 0, 0, 0	V.27 *ter* fall back mode	2400 bit/s, V.27 *ter*
0, 1, 0, 0	V.27 *ter*	4800 bit/s, V.27 *ter*
1, 0, 0, 0	V.29	9600 bit/s, V.29
1, 1, 0, 0	V.27 *ter* and V.29	7200 bit/s, V.29
0, 0, 1, 0	Not used	14400 bit/s, V.33
0, 1, 1, 0	Reserved	12000 bit/s, V.33
1, 0, 1, 0	Not used	Reserved
1, 1, 1, 0	V.27 *ter* and V.29 and V.33	Reserved
0, 0, 0, 1	Not used	14400 bit/s, V.17
0, 1, 0, 1	Reserved	12000 bit/s, V.17
1, 0, 0, 1	Not used	9600 bit/s, V.17
1, 1, 0, 1	V.27 *ter* and V.29 and V.33 and V.17	7200 bit/s, V.17
0, 0, 1, 1	Not used	Reserved
0, 1, 1, 1	Reserved	Reserved
1, 0, 1, 1	Not used	Reserved
1, 1, 1, 1	Reserved	Reserved
15	R8×7.7 lines/mm and/or 200×200 pels/25.4mm	R8×7.7 lines/mm and/or 200×200 pels/25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capability
17, 18	Recording width capabilities	Recording width
(0, 0)	1728 picture elements along scan line length of 215 mm ± 1%	1728 picture elements along scan line length of 215 mm ± 1%
(0, 1)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% 2432 picture elements along scan line length of 303 mm ± 1%	2432 picture elements along scan line length of 303 mm ± 1%
(1, 0)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1%	2048 picture elements along scan line length of 255 mm ± 1%
(1, 1)	Invalid	Invalid
19, 20	Maximum recording length capability	Maximum recording length
(0, 0)	A4 (297 mm)	A4 (297 mm)
(0, 1)	Unlimited	Unlimited
(1, 0)	A4 (297 mm) and B4 (364 mm)	B4 (364 mm)
(1, 1)	Invalid	Invalid
21, 22, 23	Minimum scan line time capability of the receiver	Minimum scan line time
(0, 0, 0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	20 ms
(0, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	40 ms
(0, 1, 0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	10 ms
(1, 0, 0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	5 ms
(0, 1, 1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking

Bit No.	DIS/DTC	DCS
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to "0".	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PSTN
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field
33	Validity of bits 17, 18	Recording width
(0)	Bits 17, 18 are valid	Recording width indicated by bits 17, 18
(1)	Bits 17, 18 are invalid	Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 ± mm 1%	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 ± mm 1%	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 ± mm 1%	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 ± mm 1%	Invalid
38	Reserved for future recording width capability.	
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8×15.4 lines/mm	R8×15.4 lines/mm
42	300×300 pels/25.4 mm	300×300 pels/25.4 mm
43	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm
44	Inch based resolution preferred	Resolution type selection "0" : neritic based resolution "1" : inch based resolution
45	Metric based resolution preferred	Don't care
46	Minimum scan line time capability for higher resolutions "0" : $T_{15.4} = T_{7.7}$ "1" : $T_{15.4} = 1/2T_{7.7}$	Don't care
47	Selective Polling capability	Set to "0".
48	Extend field	Extend field

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.
Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.
Note 1 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————	A fixed pattern is transmitted to the receiving side at a speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.

Signal	Identification Signal Format	Function
TCF (Training Check)	————	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies the sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to the sender. The sender then reduces the transmission speed by one stage and initiates training once again.
Training 2	————	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	————
RTC (Return to Control)	————	Sends 12 bits (0...01 X 6 times) to the receiver at the same speed as the image signal and notifies completion of transmission of the first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, the sender transmits an image signal of the second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	This is output when an operator call is received.

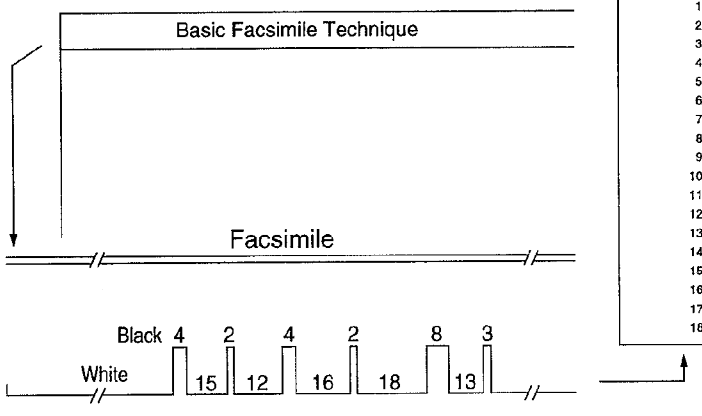
(2) Redundancy Compression Process Coding Mode
This unit uses one-dimensional MH format.

Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

(a) Document

(b) Part of document

(c) Run length and image signals equivalent to (b)



(d) Codification of (c) according to MH formula

001101111101010	011	110101	11	001000	011	101010
(White 400)	(Black 4)	(White 15)	(Black 2)	(White 12)	(Black 4)	(White 16)

11	0100111	000101	000011	10
(Black 2)	(White 18)	(Black 8)	(White 13)	(Black 3)

(c) Total bit number before MH codification (497 bit)
(d) Total bit number after MH codification (63 bit)

5.2 MODEM CIRCUIT OPERATION

The modem (IC505) has all the hardware satisfying the ITU-T standards mentioned previously.
When the ASIC IC501 (53) is brought to a low level, the modem (IC505) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC501) A0-A4. The commands are written through the data bus, and all the processing is controlled by the ASIC (IC501) according to ITU-T procedures. The $\overline{\mathrm{INT}}$ signal dispatched from $\overline{\mathrm{IRQ}}$ (pin 68 of IC505) to ASIC (IC501) when the transmission data is accepted and the received data is demodulated, the ASIC (IC501) implements post processing. This modem (IC505) has an automatic application equalizer.
With training signal 1 or 2 during G3 reception, it can automatically establish the optimum equalizer. The modem (IC505) operates using the 53.76 MHz clock (X503).

1) Facsimile Transmission

The digital image data on the data bus is modulated in the modem (IC505), and sent from pin 28, 29 via amplifier IC515 and the NCU section to the telephone line.

{IC505 (28, 29) ┬→ C605 → R607 → IC515 (6 → 7) ┬→ CN501 (8)} → CN101 (8) → C104 → R107 → C103
└→ C606 → R608 → IC515 (5 → 7)┘
→ IC101 (4 → 3)→ C131 → R146 → IC104 (6 → 7) → C152 → R163 → T101 → TEL LINE.

2) Facsimile Reception

The analog image data which is received from the telephone line passes through the NCU section and enters pin 38 of the modem (IC505). The signals that enter pin 38 of the modem (IC505) are demodulated in the board to digital image signals, then placed on the data bus.
In this case, the image signals from the telephone line are transmitted serially. Hence, they are placed on the bus in 8 bit units. Here, the internal equalizer circuit reduces the image signals to a long-distance receiving level.
This is designed to correct the characteristics of the frequency band centered about 3 kHz and maintain a constant receiving sensitivity. It can be set in the service mode.

TEL LINE → T101 → R144 → C138 → IC104 (2 → 1) → C126 → R114 → C105 → IC101 (1 → 2) → C102
→ CN101 (7) → {CN501 (7) → R617 →IC515 (2 → 1) → C611 → R603 → R629 → IC505 (38)}

{ } : Digital board

3) DTMF Transmission (Monitor tone)

The DTMF signal generated in the modem (IC505) is output from pin 28, 29, and is then sent to the circuit on the same route as used for facsimile transmission.

(Line Send) {IC505 (28, 29)┬→ C605 → R607 → IC515 (6→7) ┬→ CN501(8)} → CN101 (8) → C135 → R150
└→ C606 → R608 → IC515 (5→7)┘
→ IC103(48→ 31)→C132 →R147 → IC104 (6 → 7) → C152 → R163 → T101 → TEL LINE

(DTMF Monitor Tone)

{IC514 (17, 18) ┬→ C601 → R604 → IC516 (6 → 7) ┬→ CN501 (10)} → CN101 (10) → C134 → R149 → IC103 (46 → 53)
└→ C602 → R605 → IC516 (5 → 7)┘
→ R165 → C153 → IC103 (54 → 56) → C106 → R116 → IC102 (4 → 5, 8) → $\begin{matrix}\mathrm{L110}\\\mathrm{L111}\end{matrix}$ →Speaker

4) Call Tone Transmission

This is the call signal which is generated in the ASIC (IC501) and sent to the speaker.

{IC501 (34) → R563 → CN501 (11)} → CN101 (11) → C142 → R156 → IC103 (52 → 53) → R165 → C153
→ IC103 (54 → 56) → C106 → R116 → IC102 (4 → 5, 8) → $\begin{matrix}\mathrm{L110}\\\mathrm{L111}\end{matrix}$ → Speaker

5) Busy/Dial Tone Detection

The path is the same as FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC505) becomes 1, and this status is monitored by the ASIC (IC501).

Note:

{ }: Inside the digital board

6. DESCRIPTION OF BLOCK DIAGRAM IN ANALOG SECTION

(1) Function

The analog section is composed of the following circuits.

① Interface circuit to connect with telephone line (NCU)

② Analog gate array (IC103)

- (1) To change the circuit configuration for Tx/Rx signals of speaker phone, Tx/Rx signals of handset, and fax signals.
- (2) Adjust volume of speaker.
- (3) Control other circuits such as NCU.
- (4) Read information sent from sensors and NCU.

Following is the detailed description of each circuit.

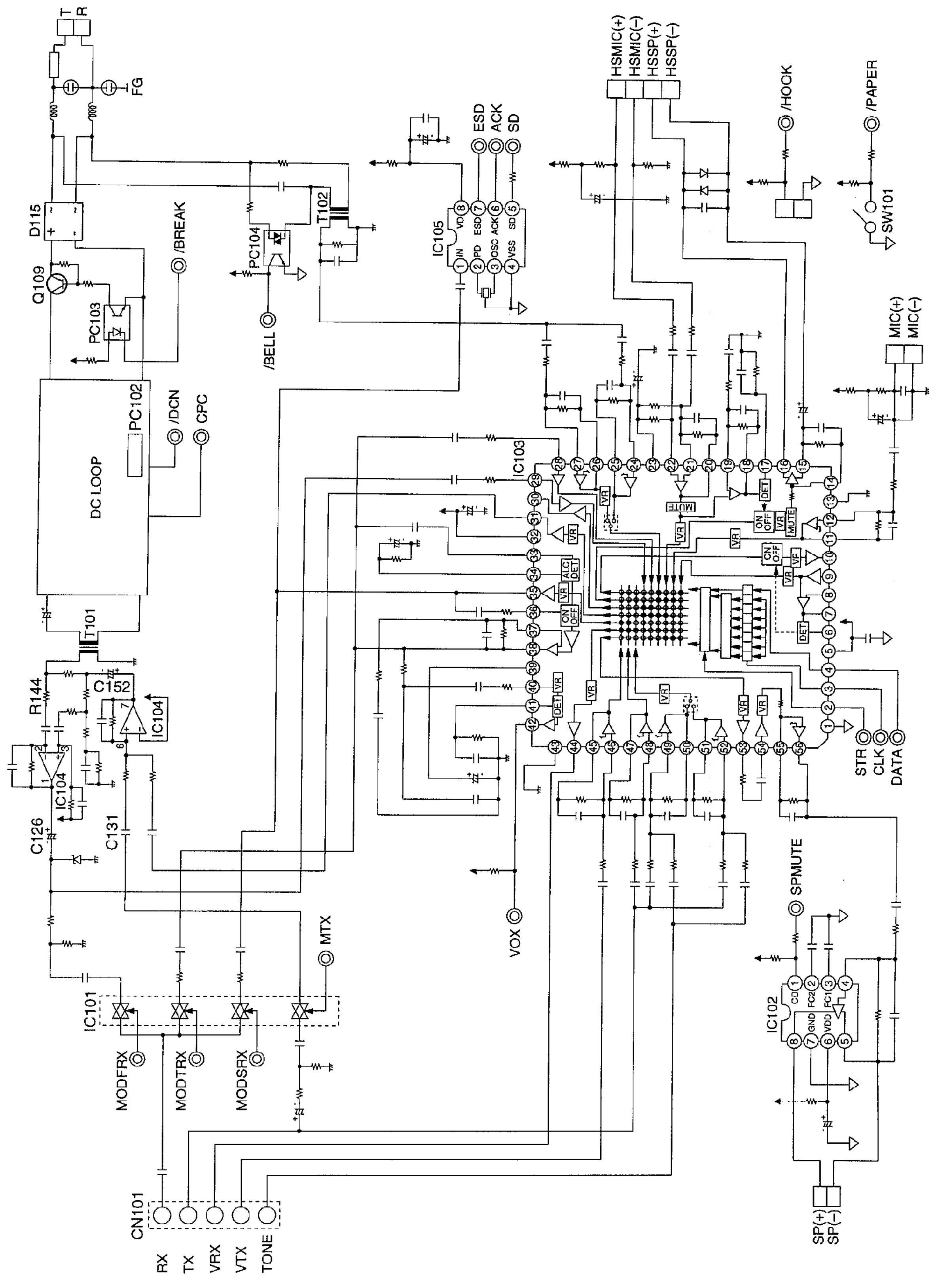
[NCU]:Network Control Unit

The NCU comprises of the following; DC loop forming circuit to connect with the telephone line; Switching circuit for other interconnected telephones; Bell detection circuit; Pulse dial generation circuit; Extension line phone off-hook detection circuit; Sidetone circuit; Remote fax activation circuit. Refer to page 171 for the details.

[Analog gate array (IC103)]

The cross-point switch installed in this IC makes it possible to change the circuit configuration for any analog signals such as the fax signals sent from the digital MODEM board or the Tx/Rx signals for speaker phone. In addition, this analog gate array integrates a handset circuit, signal level adjusting circuit, ALC (Auto level controller) circuit, electronic volume, input/ output ports, etc. This IC is controlled by ASIC (IC501) on the digital board.

Analog Unit Block Diagram


T
R
FG
D115
Q109
PC103
/BREAK
PC104
T102
/BELL
IC105
IN
PD
OSC
VSS
VD
ESD
ACK
SD
ESD
ACK
SD
HSMIC(+)
HSMIC(–)
HSSP(+)
HSSP(–)
/HOOK
/PAPER
SW101
MIC(+)
MIC(–)
DC LOOP
PC102
/DCN
CPC
IC103
MUTE
VR
DET
ALC DET
ON OFF
T101
R144
C152
IC104
C126
C131
MTX
IC101
MODFRX
MODTRX
MODSRX
CN101
RX
TX
VRX
VTX
TONE
VOX
SPMUTE
IC102
CD
FC2
FC1
GND
VDD
SP(+)
SP(–)
STR
CLK
DATA

7. NCU SECTION

7.1 GENERAL

This section is the interface with the telephone line, and this composed of renmote FAX activation circuit, bell detection circuit, pulse dial circuit, CPC detection circuit, line amplifier and sidetone circuit and multiplexer.

7.2 REMOTE FAX ACTIVATION CIRCUIT

1) Circuit Operation

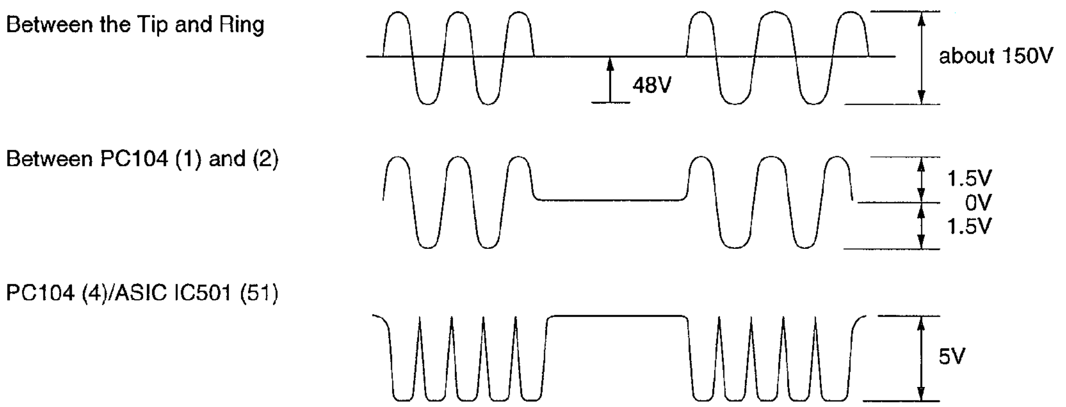
After detecting the bell signal, another telephone connected to same line activate the set to FAX mode by using DTMF signal.

TEL LINE → T102 → C207 → R209 → IC103 (27 → 35) → C204 → IC105 (1)

7.3 BELL DETECTION CIRCUIT

1) Circuit Operation

The signal waveform for each section is indicated below. The signal (low level section) input to pin 51 of ASIC IC501 on the digital board is read.



TEL LINE → PC104 (1, 2 → 4) → IC501 (51): Bell

7.4 PULSE DIAL CIRCUIT AND ON/OFF HOOK CIRCUIT

1) Circuit Operation

While OFF-HOOK, Q109 is ON. The photocoupler PC103 pin (2) is a low level by IC501 pin (42) and PC103 (3) and (4) are shorted.
During a pulse dial operation, PC103 pin (2) becomes a high level by IC501 pin (42), so that PC103 pin (3) and (4) are opened. The line turns OFF. ON/OFF, controlled by IC501 pin (42), makes the pulse dial operation possible.

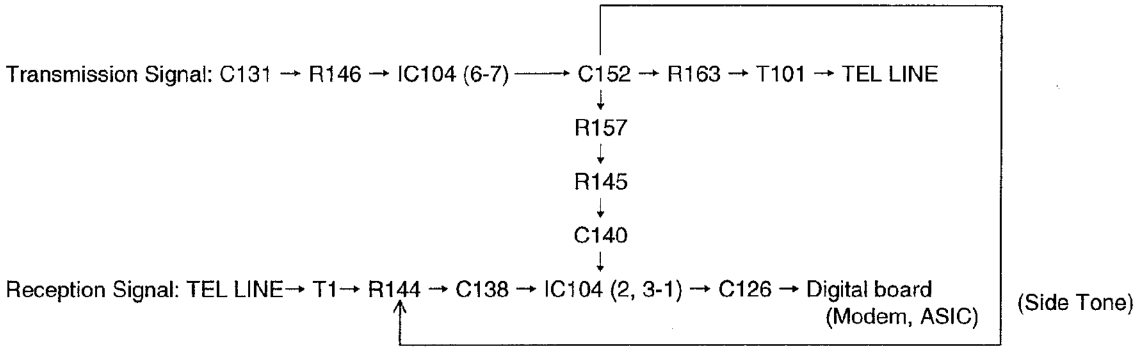
IC501 (42) Break High Level → CN102 (1) → Q109 OFF → PC103 (2) High level → PC103 (3)(4) OFF: DC Loop OFF (ON HOOK Status)

IC501 (42) Break Low Level → CN102 (1) → Q109 ON → PC103 (2) Low level → PC103 (3)(4) ON: DC Loop ON (OFF HOOK Status)

7.5 LINE AMPLIFIER AND SIDE TONE CIRCUITS

1) Circuit Operation

The reception signal received as output from line transformer T101 is given as input to R144, C138 and IC104 pin (2). Then it is input to the reception system at an amplifier gain of 5.9 dB from pin 1.
The transmission signal given as input to IC104 pin (6) via C131, and R146 is amplified to about 13 dB. It is output from pin 7 of IC104 and is transmittted to T101 via C152, R163. Without a side tone circuit, the transmission signal would return to the reception amplifier via C152 and R163. Here, the signal output from IC104 pin (7) passes through C152, R157, R145 and C140 and enters the amplifier IC104 pin (3). This is used to cancel the return portion of the transmission signal. This is the side tone circuit.


Transmission Signal: C131 → R146 → IC104 (6-7) → C152 → R163 → T101 → TEL LINE
R157
R145
C140
Reception Signal: TEL LINE→ T1→ R144 → C138 → IC104 (2, 3-1) → C126 → Digital board (Modem, ASIC)
(Side Tone)

7.6 AUTO DISCONNECT CIRCUIT

1) Function

This circuit is used to detect the fact that another telephone connected to the same line is OFF-Hook.

2) Circuit Operation

Tip (Ring) → D115 → Q109 → C192 → D109 → R195 → Q107 → PC102

During this interval C197 charges and the base of Q107 becomes high, and PC102 pin (2) becomes low, causing PC102 to go ON.
If a parallel-connected telephone or external telephone is put into an OFF-HOOK status, charge ceases to flow C192 and the base of Q107 becomes low, causing PC102 to go OFF.
When a line is connected, Q107 and PC102 go ON, causing pin 21 of IC501 (ASIC) of Digital board to go low. When the line is disconnected, Q107 and PC102 go off, causing pin 21 of IC501 (ASIC) of Digital board to go high.

7.7 CPC (Calling Party Control) DETECTION CIRCUIT

1) Function

This circuit detects the signal (cuts the current) output from the converter when the other party finishes ICM recording and goes ON-hook.
TAD detect this signal and disconnects the line. When TAD is operating, pin 4 of PC101 becomes low level.
While detecting the CPC signal, pin 4 of PC101 becomes high level. This is detected, the TAD operation is stopped and the line is disconnected.

8. ITS (Integrated telephone System) and MONITOR SECTION

8.1 GENERAL

The general ITS operation is executed by the special IC103. This IC has handset circuit in 1 chip. The alarm tone, the key tone, and the beep are outputted from the ASIC IC501 (digital board). At the time of pulse dial operation, the monitor tone is outputted from the ASIC IC501.

8.2 SPEAKER PHONE CIRCUIT

1) Function

The circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

2) Circuit Operation

The speakerphone can only provide duplex.

3) Signal path

Refer to page 78.

8.3 HANDSET CIRCUIT

1) Function

This circuit is for conversation of Handset; transmission and reception of the voice via Handset.

2) Signal path

Refer to page 78.

8.4 MONITOR CIRCUIT FOR EACH SIGNALS

1) Function

This circuit is for monitoring of various tone, such as ① DTMF tone, ② Alarm/Beep/Key tone/Bell ③Dummy ring back tone.

2) Signal path

Refer to pages 78 and 79.

9. ATAS (Automatic Telephone Answering System) SECTION

1) Function

The ATAS main operation is executed by the special IC505 (MODEM) and IC514 (CODEC), IC513 (FLASH MEMORY) control signals are input from ASIC IC103.

① Greeting/Message Recording
② ICM Recording
③ Greeting/Message/ICM play to speaker
④ Greeting/Message/ICM play to Tel Line
⑤ Vox Detection

2) Signal Path

Refer to pages 78 and 79.

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8.1 GENERAL

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2) Signal path

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② ICM Recording
③ Greeting/Message/ICM play to speaker
④ Greeting/Message/ICM play to Tel Line
⑤ Vox Detection

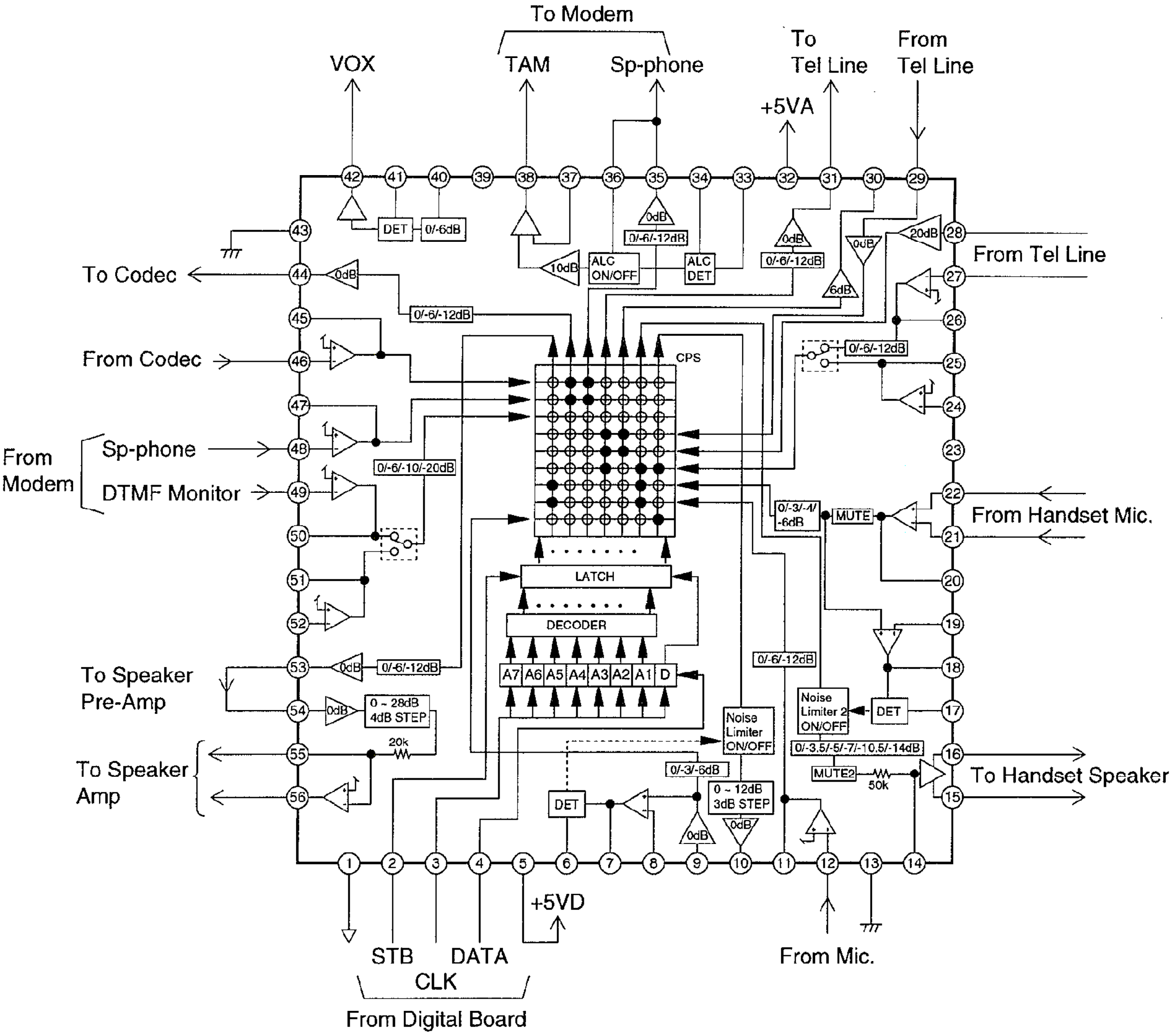
2) Signal Path

Refer to pages 78 and 79.

10. ANALOG GATE ARRAY (IC103 on the Analog Board)

This IC can perform signal route switching and level adjustments for various types of analog signals. This IC incorporates a cross-point switch (CPS), electronic volume, auto level controller (ALC) circuit for recording, attenuation circuit. The C.P.S. of this IC is controlled by sending data from digital board.

10.1 Internal Connections


To Modem
VOX
TAM
Sp-phone
To Tel Line
From Tel Line
+5VA
DET
0/-6dB
0dB
0/-6/-12dB
10dB
ALC ON/OFF
ALC DET
6dB
20dB
From Tel Line
To Codec
From Codec
CPS
From Modem
Sp-phone
DTMF Monitor
0/-6/-10/-20dB
0/-3/-4/-6dB
MUTE
From Handset Mic.
LATCH
DECODER
A7 A6 A5 A4 A3 A2 A1 D
To Speaker Pre-Amp
0 ~ 28dB 4dB STEP
20k
To Speaker Amp
Noise Limiter ON/OFF
Noise Limiter 2 ON/OFF
0/-3.5/-5/-7/-10.5/-14dB
MUTE2
50k
To Handset Speaker
0/-3/-6dB
0 ~ 12dB 3dB STEP
+5VD
STB
DATA
CLK
From Digital Board
From Mic.

10.2 EXPLANATION OF ANALOG GATE ARRAY (IC103 on the Analog Board)

No.	Name	Function	No.	Name	Function
1	D-GND	Digital ground	29	LINEIN	Line amp input
2	STR	Strobe input	30	DHOUT	Not used
3	CLOCK	Clock input	31	LINEOUT	Line amp output
4	DATA	Data input	32	VCC	Analog power supply
5	VDD	Logic power supply	33	ALCIN	ALC input
6	NL1DET	Not used	34	ALCDET	ALC output
7	NL1OUT	Not used	35	PROUT2	Preamp output2
8	NL1IN	Not used	36	RECIN	Record input
9	CLIN	Not used	37	RECPRIN	Record preamp input
10	CLOUT	Not used	38	RECPROUT	Record preamp output
11	MICOUT	Mic amp output	39	VREF2	Internal reference voltage output
12	MICIN	Mic amp input	40	VOXIN	VOX input
13	GND	Analog ground	41	VOXDET	VOX detection adjustment
14	RIN	HS receiver amp input	42	VOXOUT	VOX output
15	ROUT1	HS receiver amp output1	43	GND2	Analog ground
16	ROUT2	HS receiver amp output2	44	LSRXOUT	SP phone TX amp output from mic
17	NL2DET	HS TX detection adjustment	45	LSTXOUT	SP phone RX amp output from codec
18	NL2OUT	HS TX detection amp input	46	LSTXIN	SP phone RX amp inverting input from codec
19	NL2IN	HS TX detection amp output	47	PLYOUT	SP phone TX amp output from modem
20	HSMICOUT	HS mic amp output	48	PLYIN	SP phone TX amp inverting input from modem
21	MSMIC−	HS mic amp −input	49	TONE1IN	Tone 1 amp inout
22	HSMIC+	HS mic amp +input	50	TONE1OUT	Tone 1 amp output
23	VREF1	Analog internal reference voltage	51	TONE2OUT	Tone 2 amp output
24	CIDIN	Caller ID amp input	52	TONE2IN	Tone 2 amp input
25	CIDOUT	Caller ID amp output	53	PROUT1	Preamp output1
26	EXTOUT	EXT amp output	54	SPPRIN	Speaker preamp input
27	EXTIN	EXT amp input	55	SPIN	Speaker amp input
28	DHIN	Monitor input	56	SPOUT	Speaker amp output

11. OPERATION BOARD SECTION

The unit consists of a LCD (Liquid crystal display), KEYs and LEDs (light-emitting diodes). They are controlled by the Gate Array (IC301) and ASIC (IC501: on the DIGITAL BOARD). (Fig.-a)

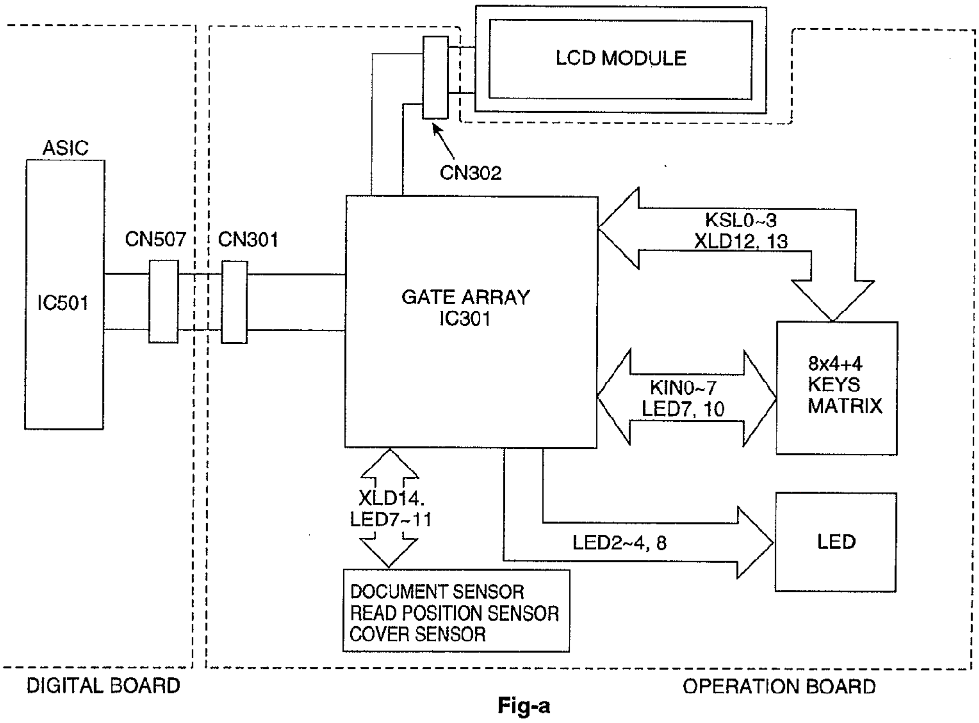

LCD MODULE
CN302
ASIC
IC501
CN507
CN301
GATE ARRAY
IC301
KSL0~3
XLD12, 13
8x4+4
KEYS
MATRIX
KIN0~7
LED7, 10
XLD14.
LED7~11
LED2~4, 8
LED
DOCUMENT SENSOR
READ POSITION SENSOR
COVER SENSOR
DIGITAL BOARD
OPERATION BOARD

Fig-a

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	SW301 ONE1, 5	SW305 ONE4, 9	SW309 STOP	SW313 REDIAL/PAUSE	SW317 *	SW321 0	SW325 #	SW329 AUTO ANSWER
KSL1	SW302 2, 7	SW306 ONE5, 10	SW310 START/COPY/SET	SW314 SP-PHONE	SW318 7	SW322 8	SW326 9	SW330 V
KSL2	SW303 ONE3, 8	SW307 LOWER	SW311 MENU	SW315 MUTE	SW319 1	SW323 2	SW327 3	SW331 Λ
KSL3	SW304 RESOLUTION	SW308 DIRECTORY PROGRAM	SW312 HELP	SW316 FLASH	SW320 4	SW324 5	SW328 6	SW332 FILM REMAINING

	LED7	LED10
XLD12	SW336 IQ-FAX	SW335 CALLER ID SEARCH
XLD13	SW334 PLAY MESSAGES	SW333 ERASE

Ref. No of operation Board

SENSOR

	LED7	LED10	LED11
XLD14	PC301 DOCUMENT TOP SENSOR	PC302 DOCUMENT SET=1	PC303 COVER OPEN=1

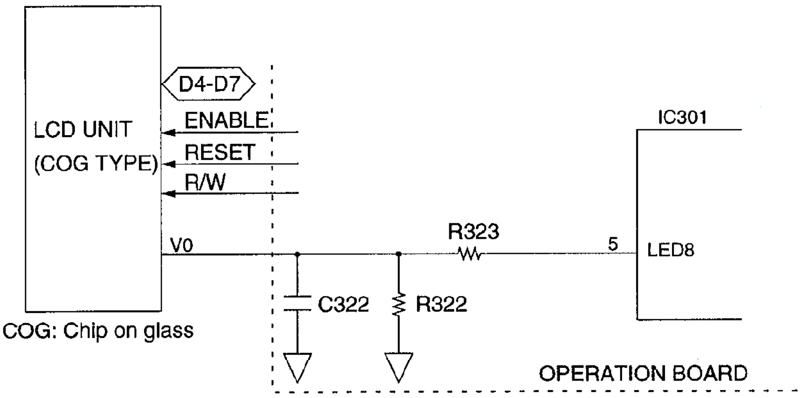
LED

	LED2	LED3	LED4	LED8
	LED301 SP-PHONE	LED302 TAD/FAX	LED303 PLAY MESSAGES	LCD CONT 0=D 1=N

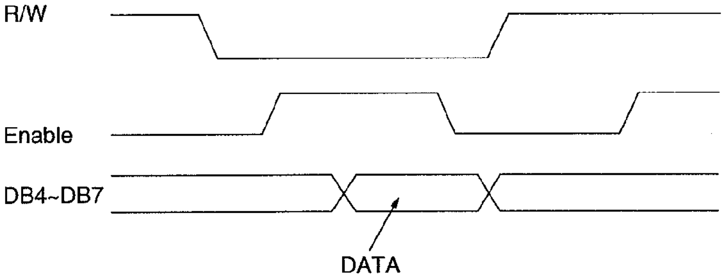
12. LCD SECTION

The Gate Array (IC301) only needs to write the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive. R323 and R322 are density control resistors.
Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC301).

Circuit Diagram


D4-D7
LCD UNIT
(COG TYPE)
ENABLE
RESET
R/W
V0
COG: Chip on glass
C322
R322
R323
IC301
5
LED8
OPERATION BOARD

Timing Chart

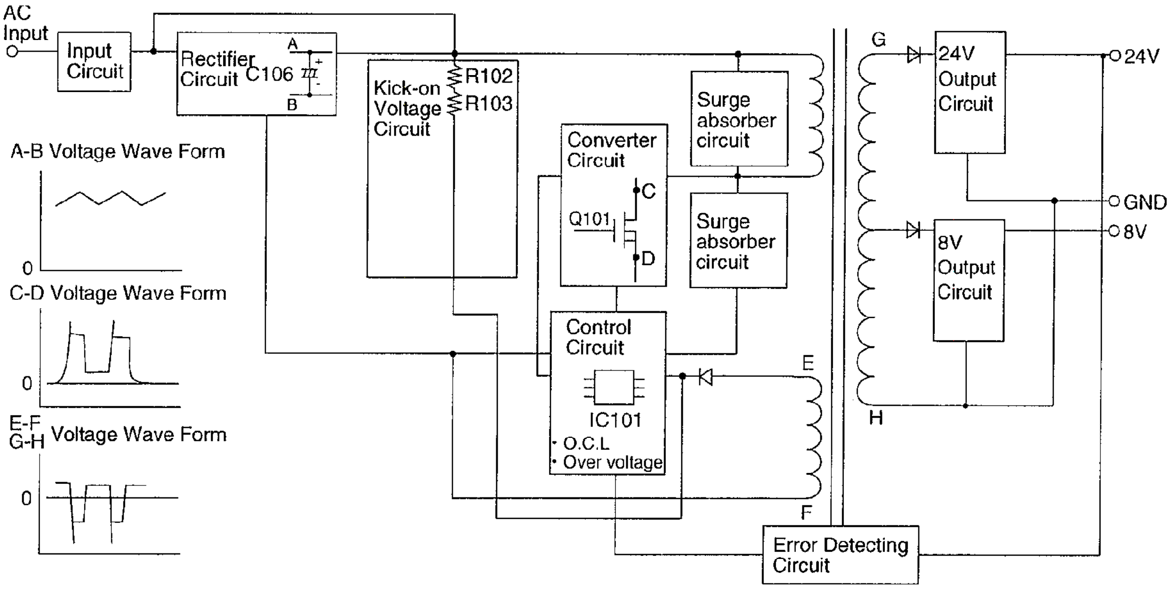

R/W
Enable
DB4~DB7
DATA

Density	Norma	Dark
LED8 (IC301-5pin)	H	L

13. POWER SUPPLY BOARD SECTION

This power supply board uses the switching regulator method.The block diagram is as follows.

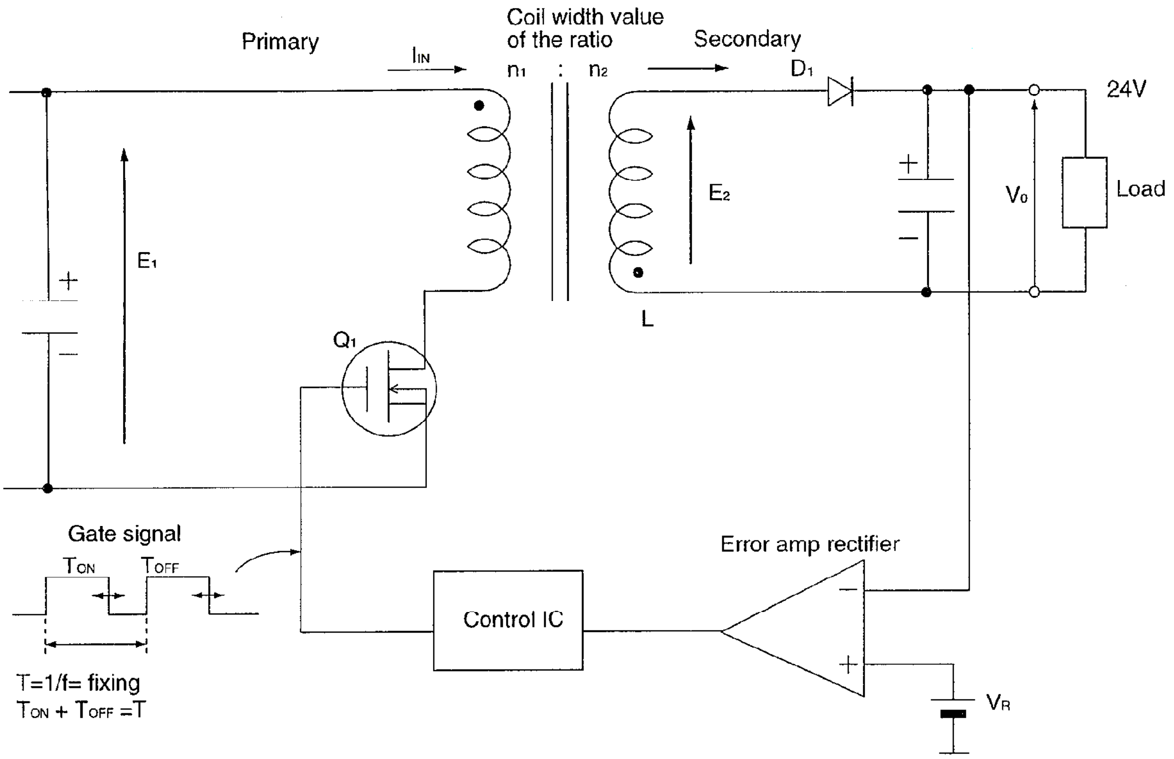
Block Diagram


AC Input
Input Circuit
Rectifier Circuit
C106
A
B
Kick-on Voltage Circuit
R102
R103
Converter Circuit
C
Q101
D
Surge absorber circuit
Surge absorber circuit
Control Circuit
IC101
• O.C.L
• Over voltage
E
F
G
H
24V Output Circuit
8V Output Circuit
24V
GND
8V
Error Detecting Circuit
A-B Voltage Wave Form
C-D Voltage Wave Form
E-F G-H Voltage Wave Form
0
0
0

[Input Circuit]
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]
The input current is rectified by D101,D102,D103 and D104 and charges C106 to make DC voltage. Then it supplies power to the converter circuit.

[Kick-on voltage circuit]
Bias is applied to the Q101 gate via this circuit when the AC power is turned on and Q101 begins operating.

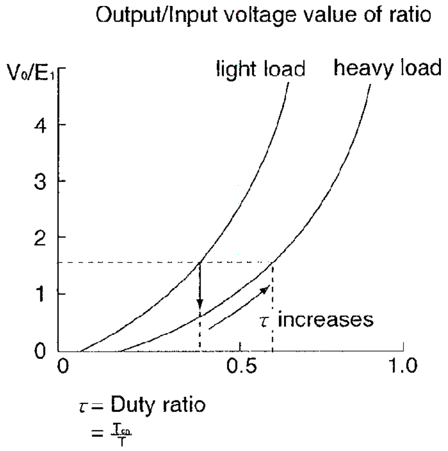

Primary
I_{IN}
Coil width value of the ratio
n_1 : n_2
Secondary
D_1
24V
E_1
E_2
V_0
Load
L
Q_1
Gate signal
T_{ON}
T_{OFF}
T=1/f= fixing
T_{ON} + T_{OFF} =T
Control IC
Error amp rectifier
V_R

Next, we will explain how the Power supply unit is controlled. The control method of this power supply unit is pulse width modulation.

When Q_1 is ON, the energy is charged in the transfer primary coil according to E_1. When Q_1 is OFF, the energy is output from the secondary transfer as follows.

$L \rightarrow D_1 \rightarrow$ Load $\rightarrow L$

Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control IC according to the error amp rectifier. Then depending on how T_{ON} is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in τ is controlled and the output voltage is stabilized.
Therefore, basically the timing: Ton/Toff of Q1 controls the output voltage.



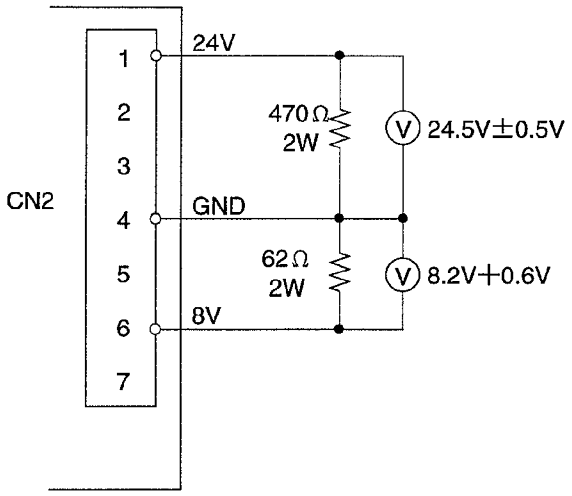
[Surge Absorber Circuit]
This circuit is for absorbing surge voltage generated by the transformer.

[Control Circuit and Detecting Circuit]
The control circuit amplifies the output with increased voltage detected in the error detecting circuit. Then it drives the main transistor.
In this power supply, the duty ratio is defined by changing the ON period of the main transistor.
This is shown as follows.
When the output voltage of the 24V circuit increases, the current of the photo coupler PC101 increases, the pulse width of the output control IC becomes narrower and the ON period of Q101 becomes shorter.

[Over Current Limiter (O.C.L)]
The highest drain current (Q101) is limited by a limiter circuit (IC101) of 24V. The 24V output is limited by this circuit.

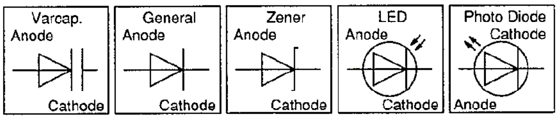
[Over Voltage Circuit]
If the 24V output increases because the error detecting circuit or control circuit is broken, IC101 will recognize this signal and output becomes 0V.

Dummy load method (to quickly check the power supply output)



FOR THE SCHEMATIC DIAGRAMS

Note:

1. DC voltage measurements are taken with an oscilloscope or a tester with a ground .
2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.
3. 
Varcap.
Anode
Cathode
General
Anode
Cathode
Zener
Anode
Cathode
LED
Anode
Cathode
Photo Diode
Cathode
Anode

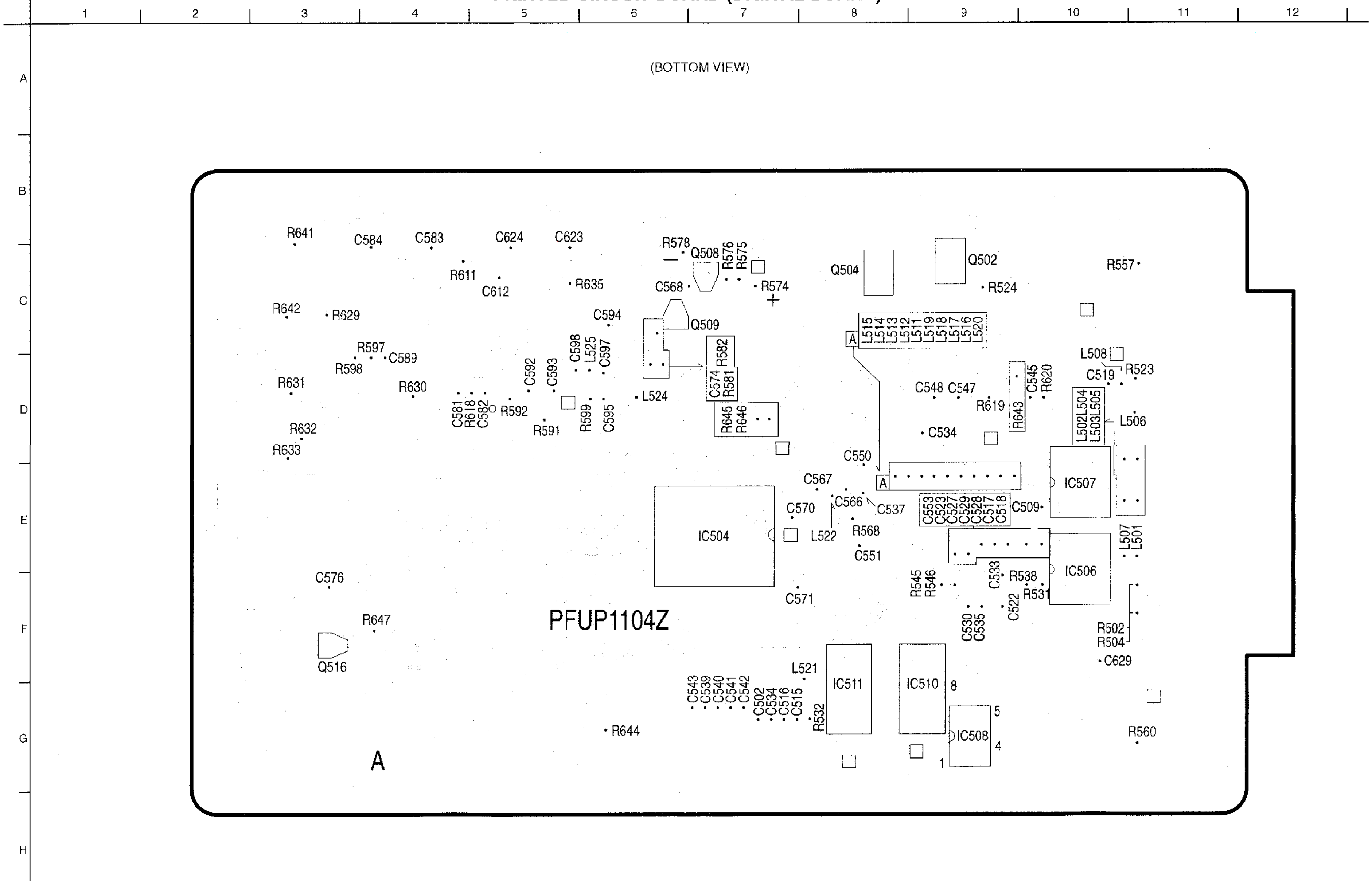
Important safety notice

Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

MEMO

KX-FP270 **KX-FP270**

PRINTED CIRCUIT BOARD (DIGITAL BOARD)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D
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H
(BOTTOM VIEW)
R641
C584
C583
C624
C623
R611
C612
R635
R578
Q508
R576
R575
R574
C568
Q504
Q502
R524
R557
R642
R629
C594
Q509
L515
L514
L513
L512
L511
L519
L518
L517
L516
L520
R597
R598
C589
R631
R630
C592
C593
C598
L525
C597
R582
C574
R581
L508
C519
R523
C548
C547
R619
R643
C545
R620
L502
L504
L503
L505
L506
C581
R618
C582
R592
R591
R599
C595
L524
R645
R646
C534
R632
R633
C550
C567
C570
C566
C537
C553
C523
C527
C529
C528
C517
C518
C509
IC507
IC504
L522
R568
C551
L507
L501
C576
C571
R545
R546
C533
R538
R531
C522
IC506
C530
C535
R647
PFUP1104Z
R502
R504
C629
Q516
L521
IC511
IC510
8
C543
C539
C540
C541
C542
C502
C534
C516
C515
R532
IC508
5
4
1
R644
R560
A

Notes:

1. The circuit shown in on the conductor indicates printed circuit on the back side of the printed circuit board.

Notes:

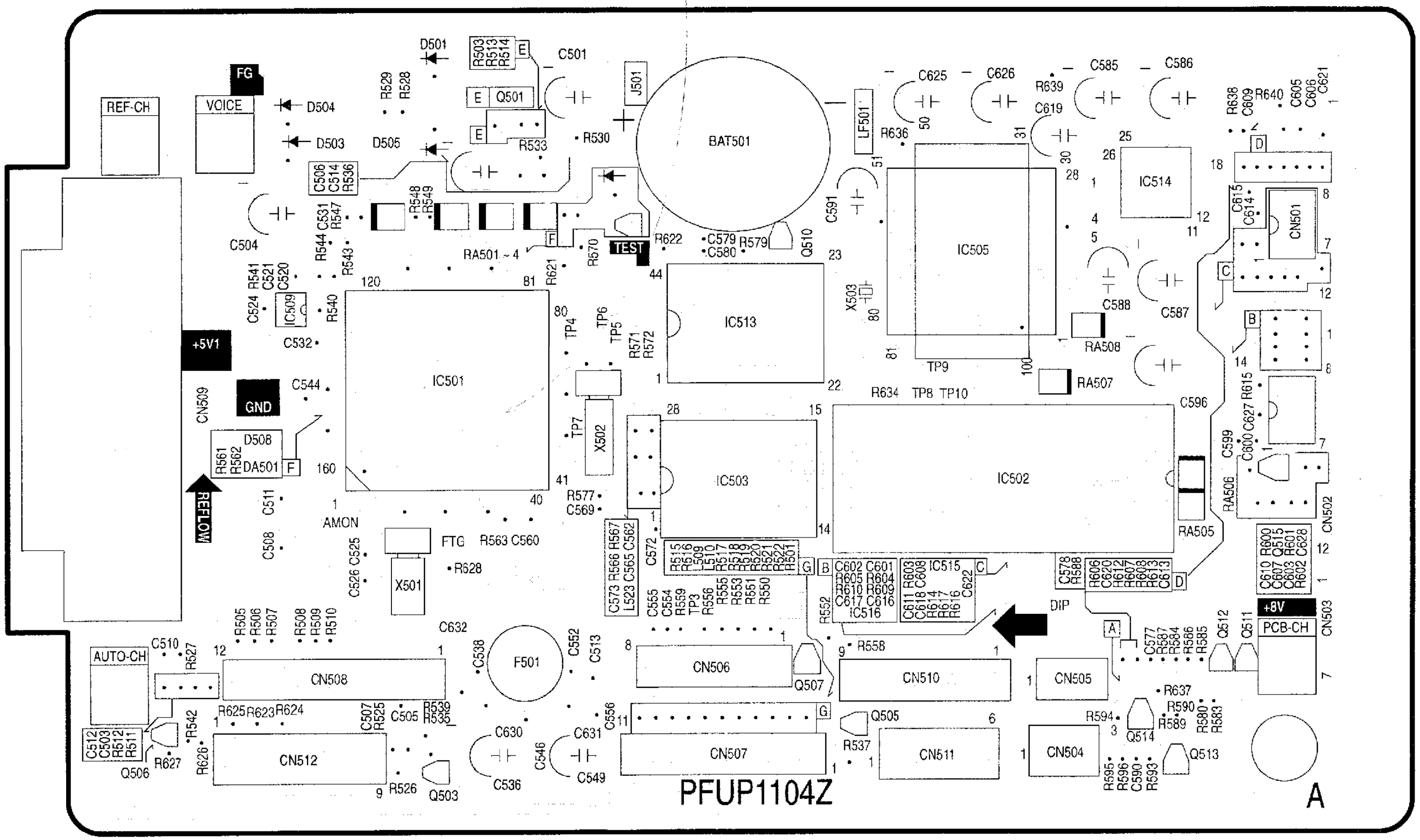
1. The circuit shown in on the conductor indicates printed circuit on the front side of the printed circuit board.

KX-FP270 **KX-FP270**

PRINTED CIRCUIT DIAGRAM (DIGITAL BOARD)

(COMPONENT VIEW)

Pin No.	Waveform	Pin No.	Waveform
7, 8	32KHz	55, 56	24MHz

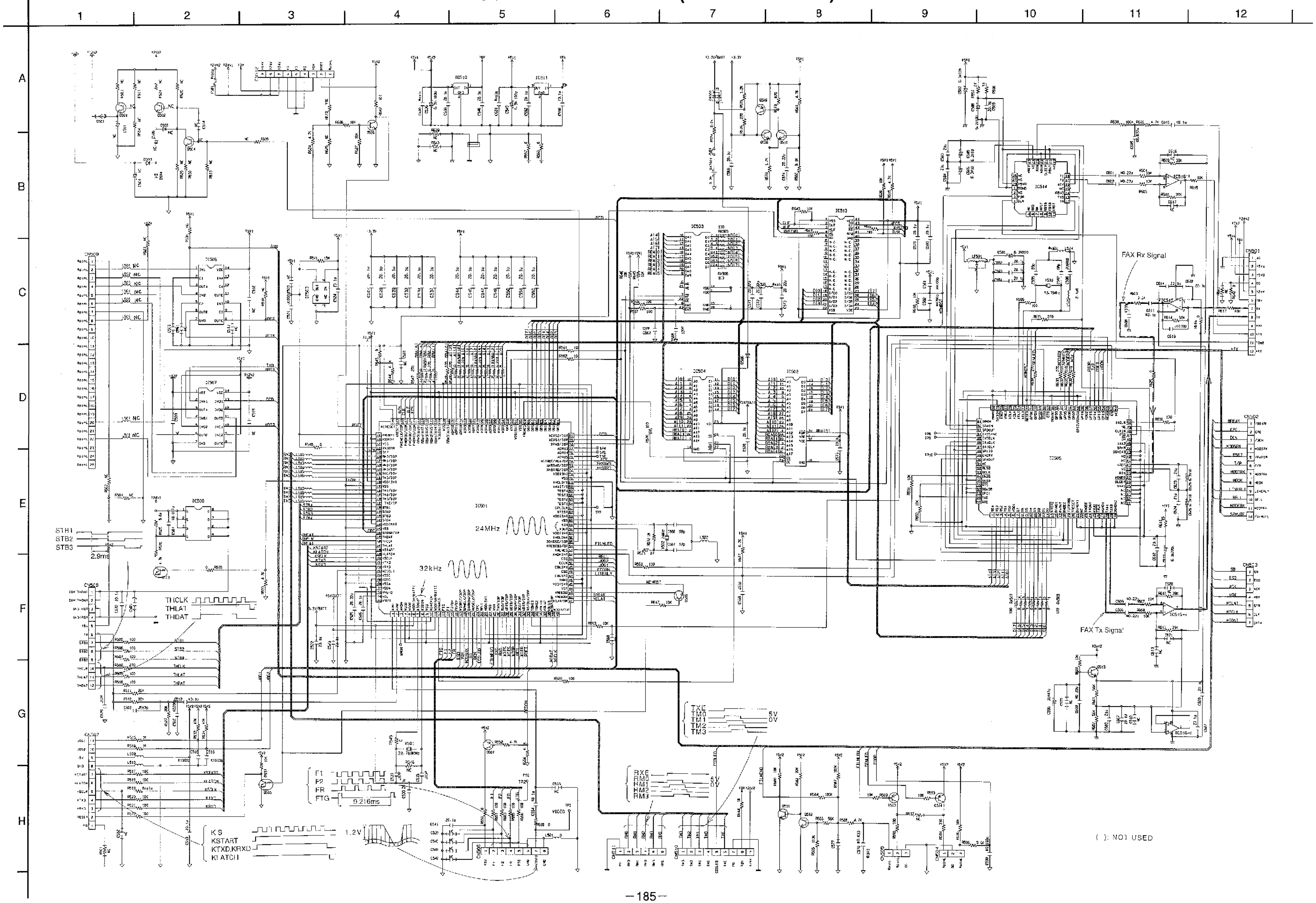


PFUP1104Z
A
REF-CH
VOICE
FG
AUTO-CH
+5V1
GND
CN509
REFLOW
TEST
+8V
PCB-CH
DIP
IC501
IC502
IC503
IC505
IC509
IC513
IC514
IC515
IC516
BAT501
J501
LF501
F501
X501
X502
X503
FTG
AMON
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
RA501 ~ 4
RA505
RA506
RA507
RA508
DA501
D501
D503
D504
D505
D508
Q501
Q503
Q505
Q506
Q507
Q510
Q511
Q512
Q513
Q514
CN501
CN502
CN503
CN504
CN505
CN506
CN507
CN508
CN510
CN511
CN512
C501
C504
C586
C585
C625
C626
C619
C587
C588
C591
C596
C630
C631
C536
C549
C546
C632
C538
C552
C513
R634

Notes:
1. The circuit shown in on the conductor indicates printed circuit on the back side of the printed circuit board.

Notes:
1. The circuit shown in on the conductor indicates printed circuit on the front side of the printed circuit board.

SCHEMATIC DIAGRAM (DIGITAL CIRCUIT)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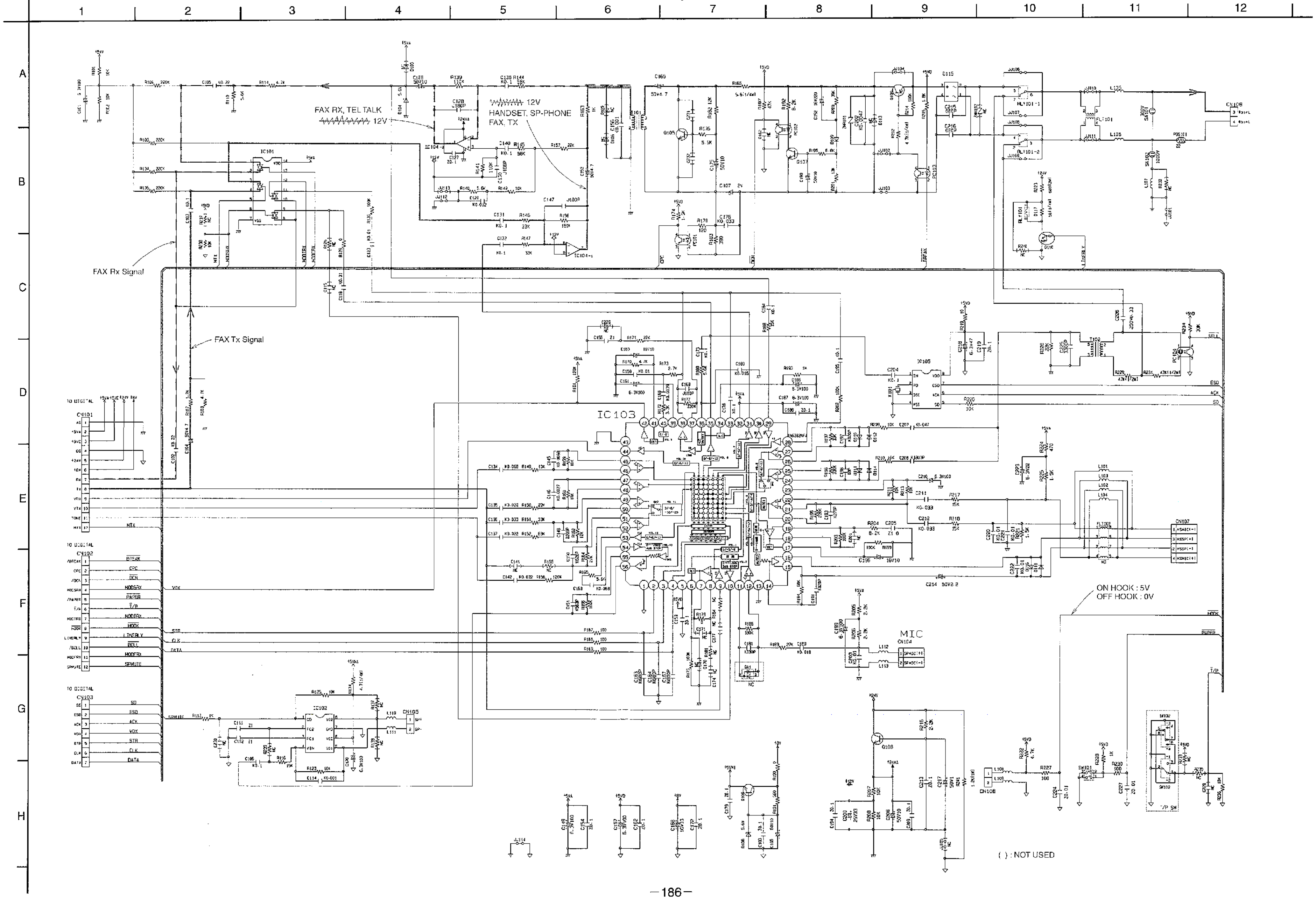
IC501
24MHz
32kHz
IC502
IC503
IC504
IC505
IC506
IC507
IC508
IC510
IC511
IC513
IC514
IC515
IC516
CN501
CN502
CN503
CN504
CN505
CN506
CN507
CN508
CN509
CN510
CN511
FAX Rx Signal
FAX Tx Signal
STB1
STB2
STB3
2.9ms
THCLK
THLAT
THDAT
TXE
TM0
TM1
TM2
TM3
5V
0V
RXE
RM0
RM1
RM2
RM3
F1
F2
FR
FTG
9.216ms
KS
KSTART
KTXD,KRXD
KLATCH
1.2V
( ): NOT USED

SCHEMATIC DIAGRAM (ANALOG CIRCUIT)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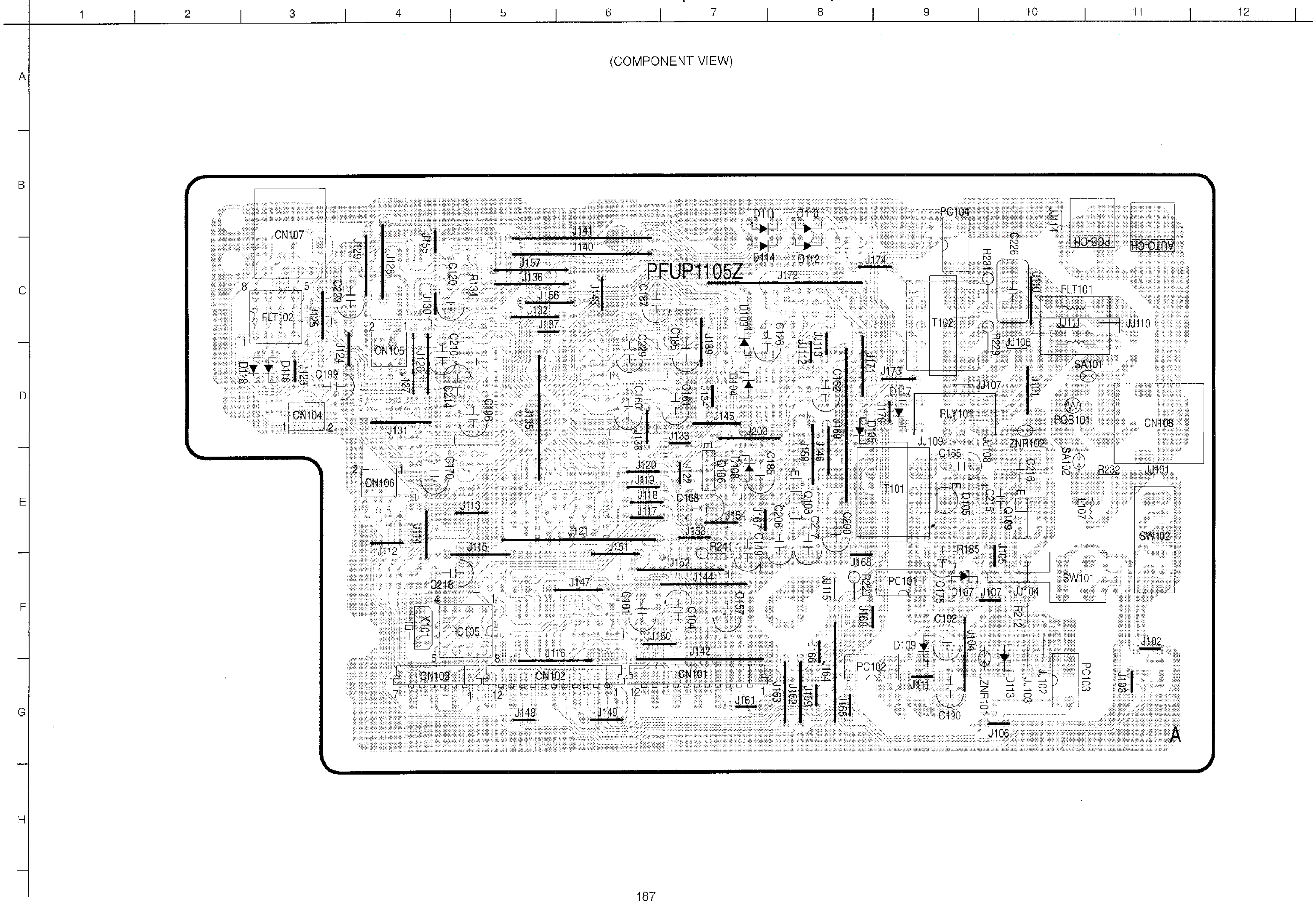
F
G
H
FAX RX, TEL TALK
12V
12V
HANDSET, SP-PHONE
FAX, TX
FAX Rx Signal
FAX Tx Signal
IC101
IC102
IC103
IC104
IC105
CN101
CN102
CN103
CN104
CN105
CN107
CN108
MIC
ON HOOK : 5V
OFF HOOK : 0V
( ) : NOT USED

KX-FP270 **KX-FP270**

PRINTED CIRCUIT BOARD (ANALOG BOARD)

(COMPONENT VIEW)



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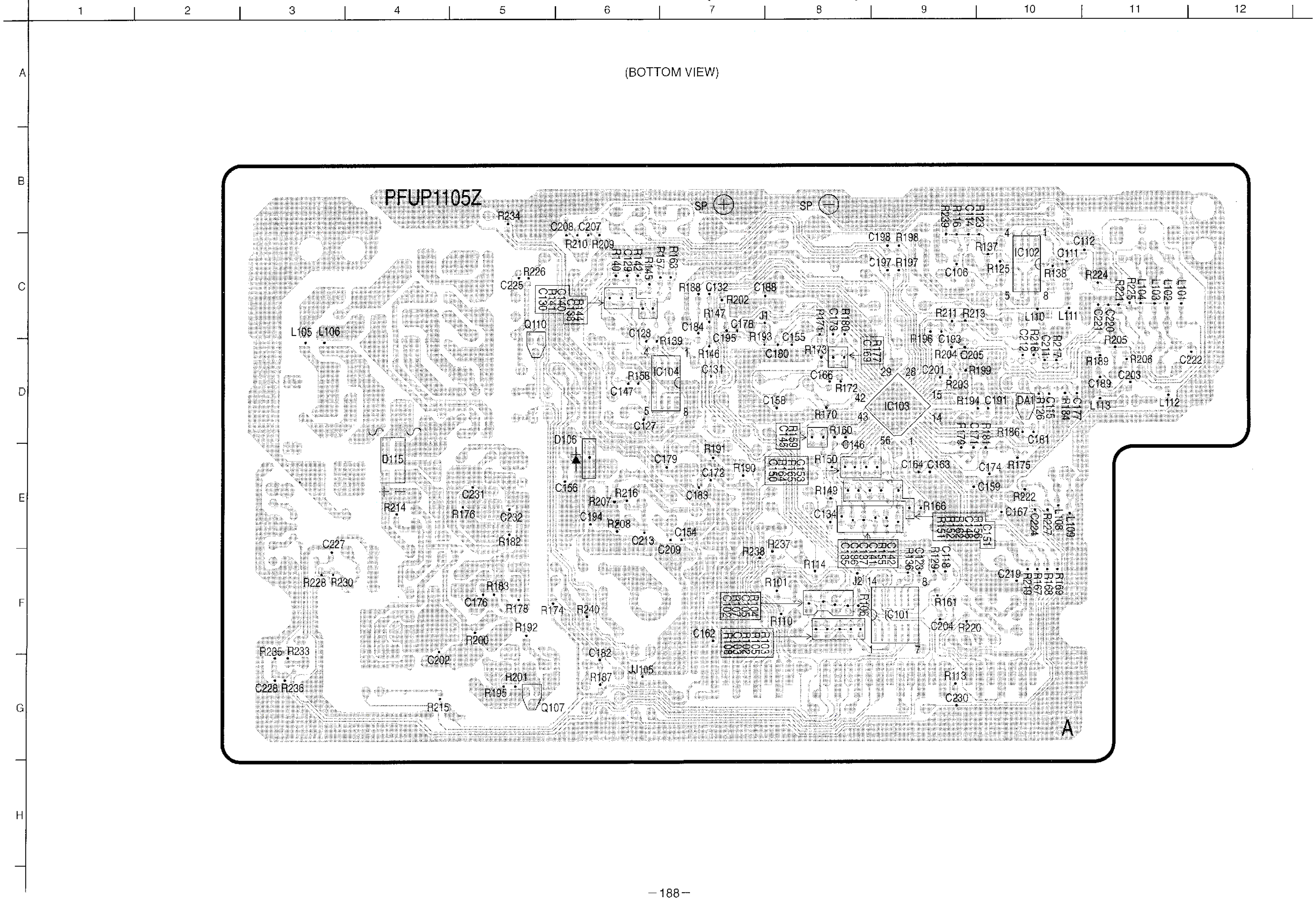
PFUP1105Z
CN107
FLT102
D118
D116
C223
J129
J128
J125
J124
J123
C199
CN104
CN105
J126
J127
J155
C120
J130
R134
C210
C214
C196
J131
C170
CN106
J113
J114
J112
J115
C218
X101
IC105
CN103
CN102
CN101
J148
J149
J116
J147
J141
J140
J157
J136
J156
J132
J137
J143
J135
C187
C229
C186
C160
C161
J139
J134
J133
J138
J145
J120
J119
J118
J117
J122
J121
J151
J152
J144
J142
C101
C104
C157
J150
Q106
D108
C185
J200
C168
J154
J153
R241
C149
J167
C206
Q108
C217
C200
D103
D104
C126
J113
JJ112
C152
J169
J146
J158
J171
J172
J173
D111
D110
D114
D112
J174
PC104
R231
C226
T102
R229
JJ106
J110
FLT101
JJ111
JJ110
SA101
POS101
CN108
JJ101
R232
SA102
ZNR102
J101
JJ107
D117
J170
D105
RLY101
JJ109
JJ108
C155
C216
C215
Q105
Q109
T101
L107
SW102
SW101
R185
J105
J168
JJ115
R223
PC101
D107
C175
J107
JJ104
R212
J160
C192
J104
D109
PC102
J111
C190
J166
J164
J163
J162
J159
J165
J161
ZNR101
D113
JJ103
JJ102
PC103
J102
J103
J106
J106
JJ114
PCB-CH
AUTO-CH

PRINTED CIRCUIT BOARD (ANALOG BOARD)

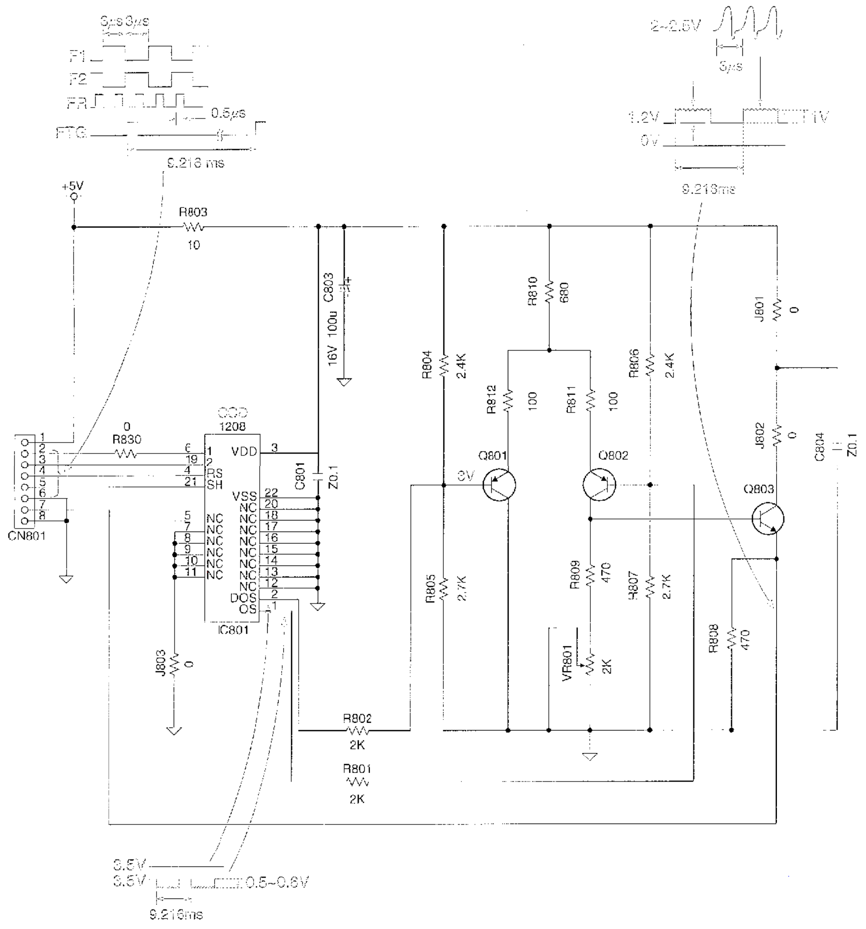


(BOTTOM VIEW)

1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H
PFUP1105Z
SP ⊕
SP ⊖
A
IC101
IC102
IC103
IC104
Q107
Q110
Q111
D106
D115
DA1
J1
J2
JJ105
L101
L102
L103
L104
L105
L106
L108
L109
L110
L111
L112
L113

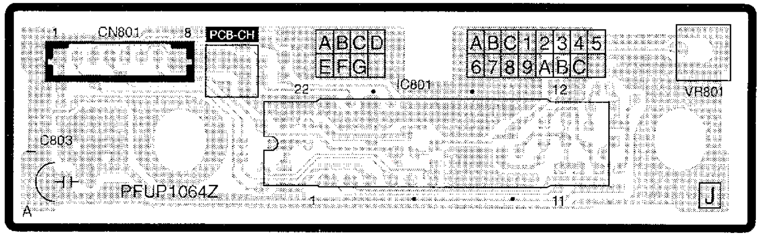
SCHEMATIC DIAGRAM AND PRINTED CIRCUIT BOARD (CCD)

CCD CIRCUIT

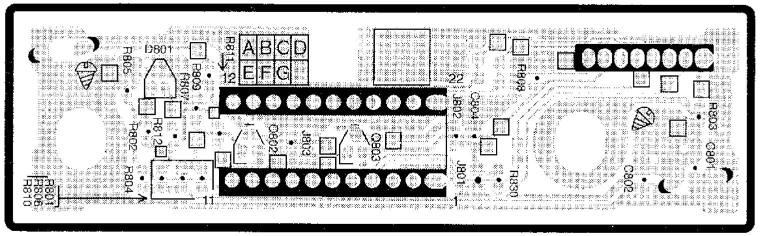

F1
F2
FR
FTG
5μs 3μs
0.5μs
9.216 ms
+5V
R803 10
C803 16V 100u
CN801
R830 0
CCD 1208
VDD
RS
SH
VSS
NC
DOS
OS
IC801
C801 Z0.1
J803 0
R804 2.4K
R805 2.7K
R810 680
R812 100
R811 100
Q801
Q802
3V
R809 470
VR801 2K
R806 2.4K
R807 2.7K
R808 470
Q803
J801 0
J802 0
C804 Z0.1
R802 2K
R801 2K
2~2.5V
5μs
1.2V
0V
1V
9.216ms
3.5V
3.5V
0.5~0.8V
9.216ms

CCD BOARD

(COMPONENT VIEW)

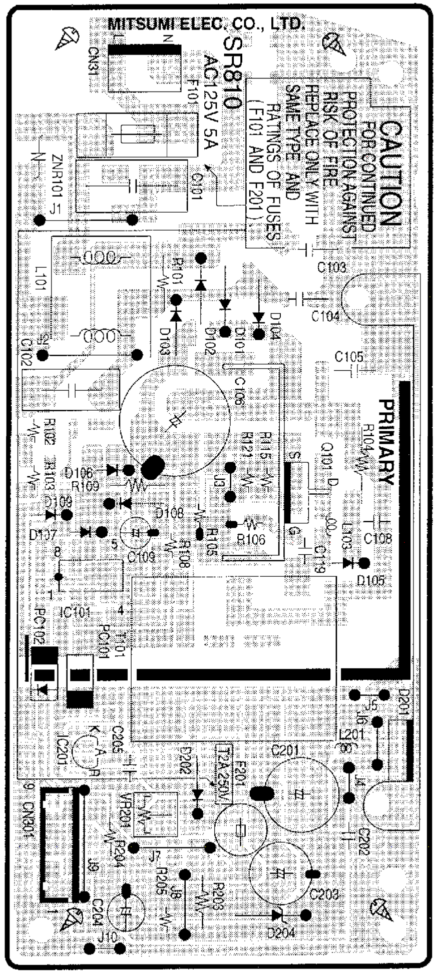

CN801
PCB-CH
ABCD
EFG
ABC12345
6789ABC
IC801
VR801
C803
PFUP1064Z
J
A
1
8
22
12
11

(BOTTOM VIEW)

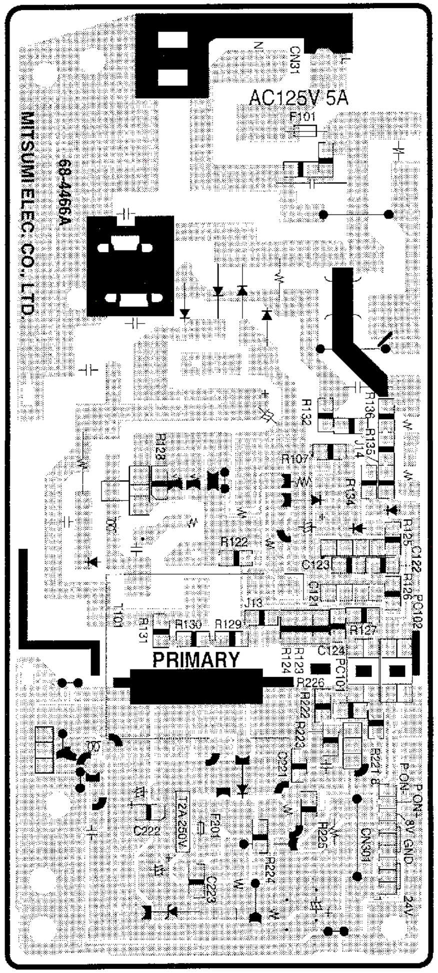

ABCD
EFG
D801
R805
R809
R807
R811
R812
R802
R804
R801
R806
R810
Q802
J803
Q803
J802
C804
J801
R808
R830
R803
C801
C802
22
12
11
1

PRINTED CIRCUIT BOARD (SWITCHING POWER SUPPLY)

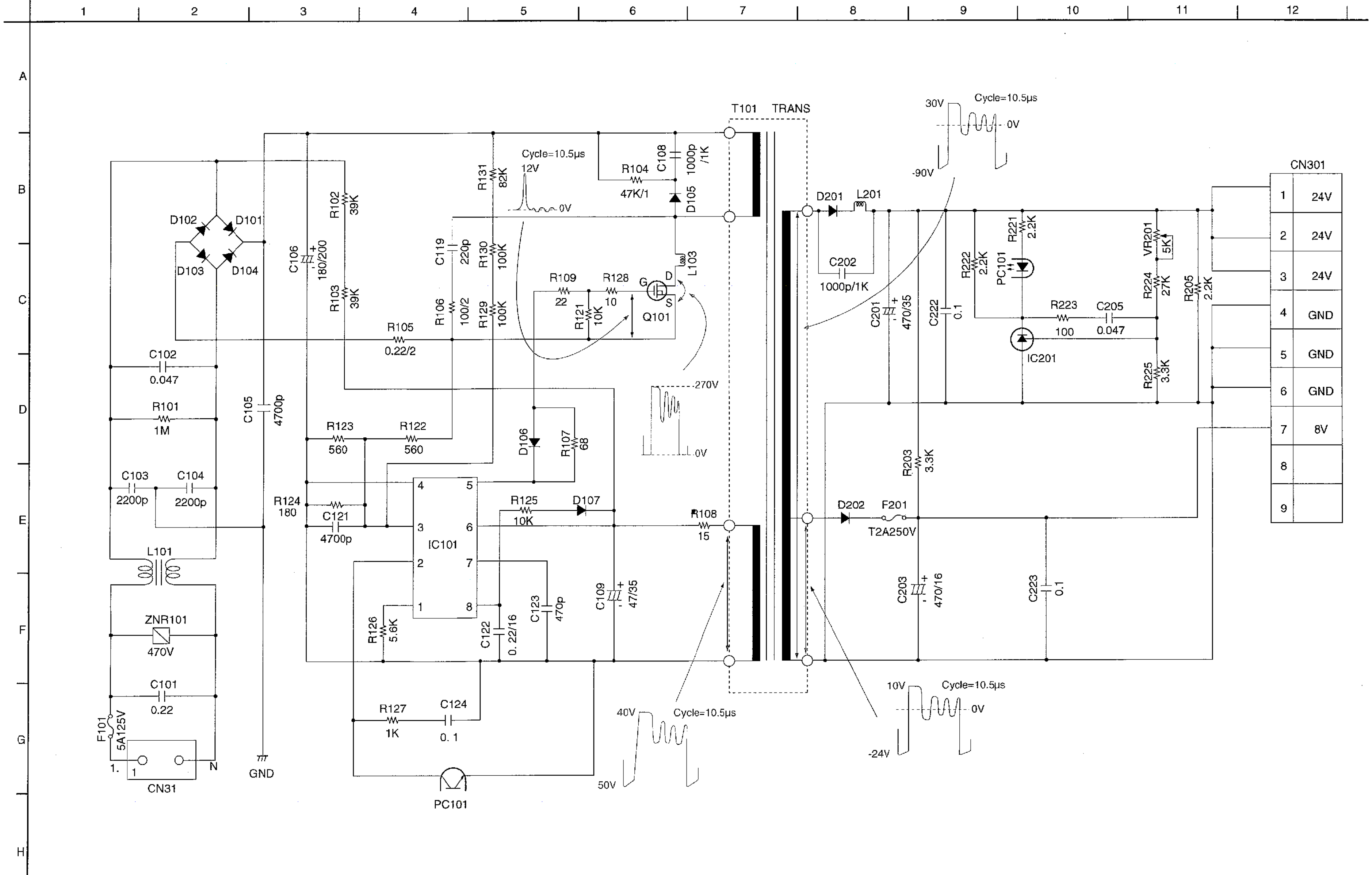
(COMPONENT VIEW)


MITSUMI ELEC. CO., LTD.
SR810
AC125V 5A
CAUTION
FOR CONTINUED PROTECTION AGAINST RISK OF FIRE. REPLACE ONLY WITH SAME TYPE AND RATINGS OF FUSES (F101 AND F201).
CN31
F101
C101
ZNR101
J1
L101
C102
C103
C104
C105
C106
D101
D102
D103
D104
R101
R102
R103
R104
R105
R106
R108
R109
R115
R121
PRIMARY
Q101
D
S
G
J3
L103
C108
C119
D105
D106
D107
D108
D109
C109
IC101
PC101
PC102
T101
D201
J5
J6
L201
J4
C201
C202
C203
D204
F201
T2A 250V
D202
R203
J8
R205
J7
VR201
R204
C205
K
A
R
IC201
J9
C204
J10
CN301

(BOTTOM VIEW)


CN31
AC125V 5A
F101
68-4466A
MITSUMI ELEC. CO., LTD.
R136
R135
J14
R134
R132
R107
R125
C122
R126
PC102
R127
C123
C121
R122
R128
J13
R129
R130
R131
T101
PRIMARY
C124
PC101
R123
R124
R226
R222
R223
C221
R221
P ON+
P ON-
8V
GND
24V
CN301
R225
R224
F201
T2A 250V
C222
C223

SCHEMATIC DIAGRAM (SWITCHING POWER SUPPLY)


1
2
3
4
5
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7
8
9
10
11
12
A
B
C
D
E
F
G
H
T101 TRANS
CN301
1 24V
2 24V
3 24V
4 GND
5 GND
6 GND
7 8V
8
9
D102
D101
D103
D104
C102 0.047
R101 1M
C103 2200p
C104 2200p
L101
ZNR101 470V
C101 0.22
F101 5A125V
1.
1
N
CN31
GND
C105 4700p
C106 180/200
R102 39K
R103 39K
R105 0.22/2
R124 180
C121 4700p
R123 560
R122 560
IC101
R126 5.6K
R127 1K
C124 0. 1
PC101
C119 220p
R106 100/2
R130 100K
R129 100K
R131 82K
Cycle=10.5µs
12V
0V
R109 22
R128 10
R121 10K
Q101
G
D
S
L103
R104 47K/1
C108 1000p /1K
D105
270V
0V
D106
R107 68
R125 10K
D107
C122 0. 22/16
C123 470p
C109 47/35
R108 15
40V
Cycle=10.5µs
50V
30V
Cycle=10.5µs
0V
-90V
D201
L201
C202 1000p/1K
C201 470/35
C222 0.1
R222 2.2K
R221 2.2K
PC101
IC201
R223 100
C205 0.047
VR201 5K
R224 27K
R225 3.3K
R205 2.2K
R203 3.3K
D202
F201 T2A250V
C203 470/16
C223 0.1
10V
Cycle=10.5µs
0V
-24V

Note:
When measuring the waveform on the primary circuit of the Switch Power Supply Board, be sure to insulate the ground of the oscilloscope's probe from the ground of its power supply.

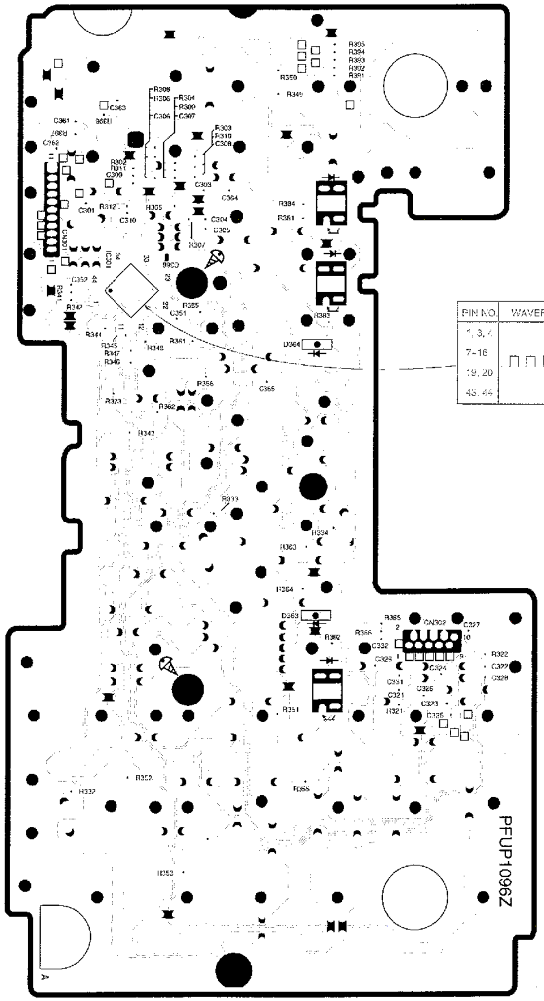
KX-FP270 **KX-FP270**

PRINTED CIRCUIT BOARD (OPERATION BOARD)

1 2 3 4 5 6 7 8 9 10 11 12

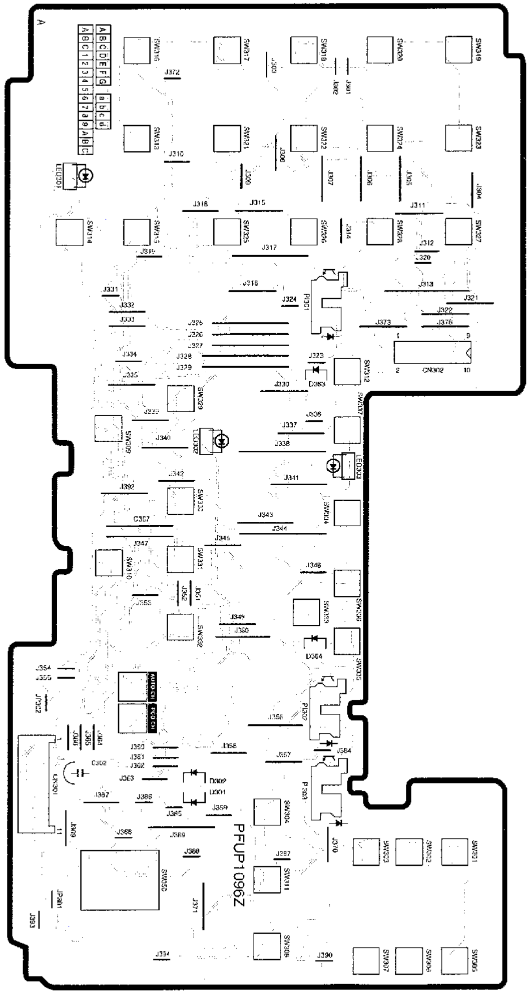
A B C D E F G H

(COMPONENT VIEW)


CN301
IC301
CN302
R385
R351
D363
D364
PFUP1096Z

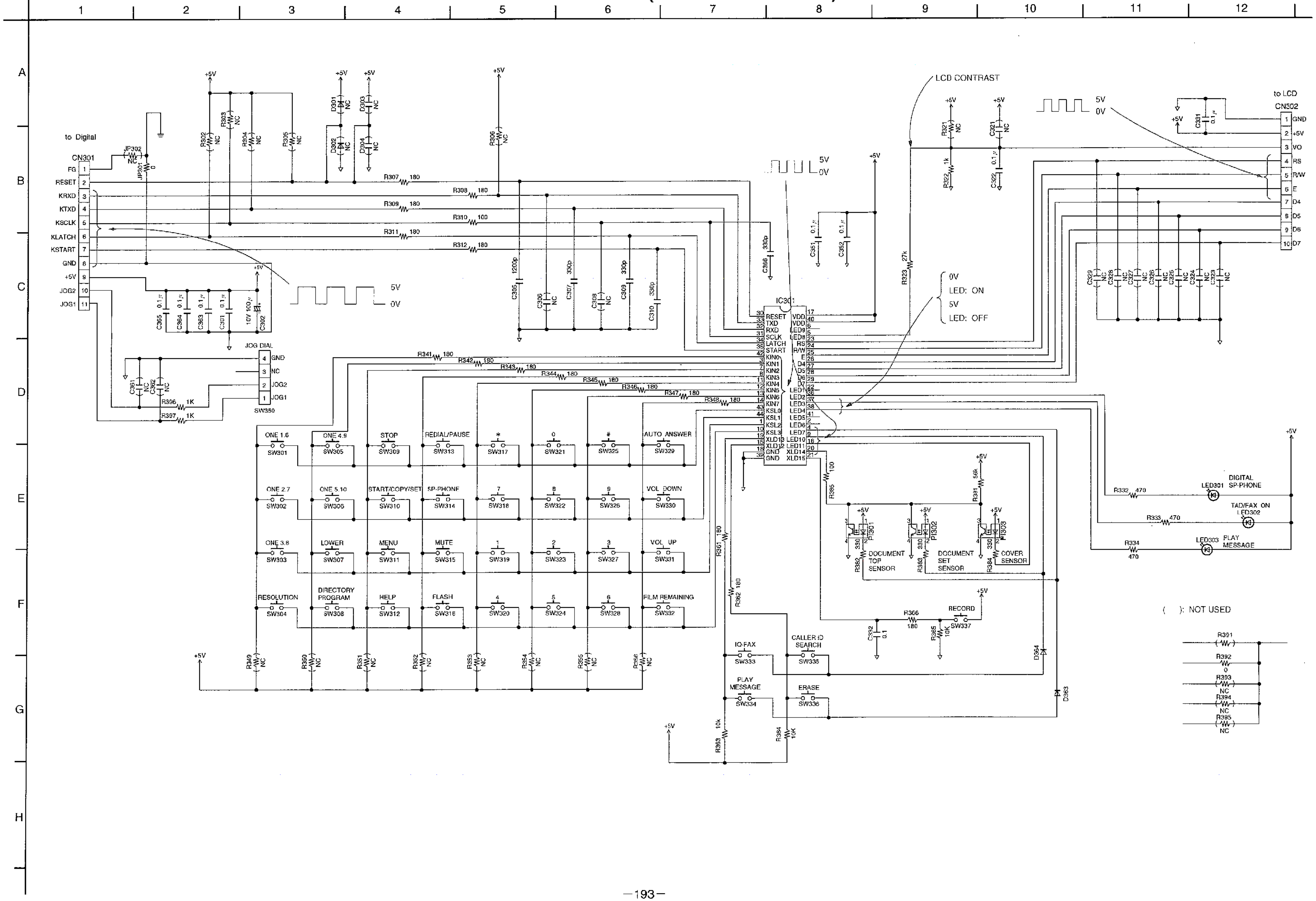
PIN NO.	WAVEFORM	PIN NO.	VOLTAGE
1, 3, 4 7~16 19, 20 43, 44	⊓⊓⊓ 5V 0V	37, 39	LED ON : 0V LED OFF : 5V

(BOTTOM VIEW)


LED301
LED302
LED303
CN301
CN302
PI301
PI302
PI303
AUTO CH
PCD CH
SW350
PFUP1096Z

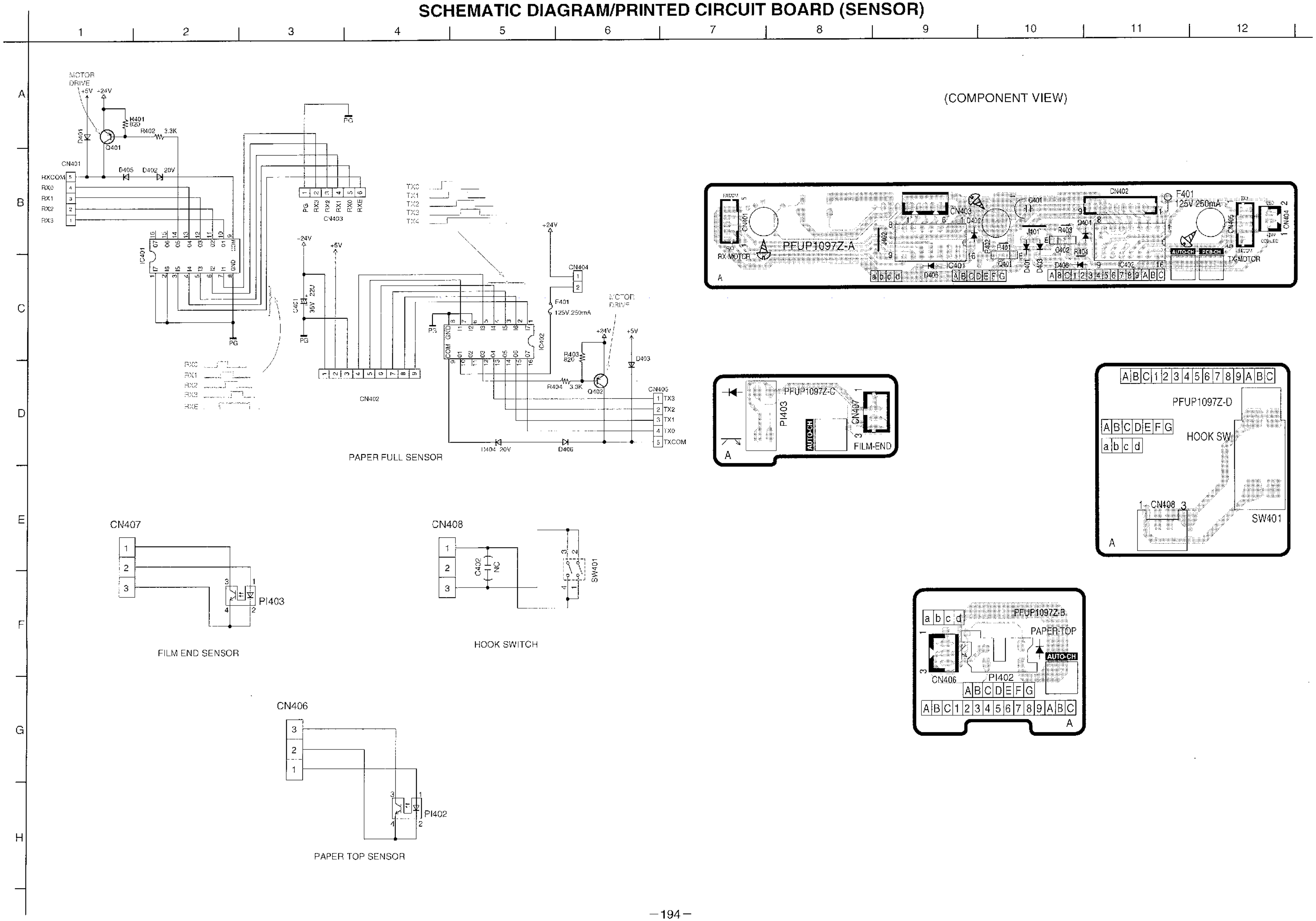
KX-FP270 **KX-FP270**

SCHEMATIC DIAGRAM (OPERATION CIRCUIT)

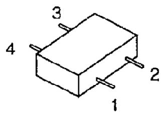

1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H
to Digital
CN301
FG
RESET
KRXD
KTXD
KSCLK
KLATCH
KSTART
GND
+5V
JOG2
JOG1
JP302 NC
JP301 0
R302 NC
R303 NC
R304 NC
R305 NC
D301 NC
D302 NC
D303 NC
D304 NC
R306 NC
R307 180
R308 180
R309 180
R310 100
R311 180
R312 180
C365 0.1μ
C364 0.1μ
C363 0.1μ
C301 0.1μ
10V 100μ C302
5V
0V
C305 1200p
C306 NC
C307 330p
C308 NC
C309 330p
C310 330p
C366 330p
C351 0.1μ
C352 0.1μ
JOG DIAL
GND
NC
JOG2
JOG1
SW350
C361 NC
C362 NC
R396 1K
R397 1K
IC301
RESET
TXD
RXD
SCLK
LATCH
START
KIN0
KIN1
KIN2
KIN3
KIN4
KIN5
KIN6
KIN7
KSL0
KSL1
KSL2
KSL3
XLD13
XLD12
GND
GND
VDD
VDD
LED9
LED8
RS
R/W
E
D4
D5
D6
D7
LED1
LED2
LED3
LED4
LED5
LED6
LED7
LED10
LED11
XLD14
XLD15
R341 180
R342 180
R343 180
R344 180
R345 180
R346 180
R347 180
R348 180
ONE 1.6 SW301
ONE 4.9 SW305
STOP SW309
REDIAL/PAUSE SW313
* SW317
0 SW321
# SW325
AUTO ANSWER SW329
ONE 2.7 SW302
ONE 5.10 SW306
START/COPY/SET SW310
SP-PHONE SW314
7 SW318
8 SW322
9 SW326
VOL DOWN SW330
ONE 3.8 SW303
LOWER SW307
MENU SW311
MUTE SW315
1 SW319
2 SW323
3 SW327
VOL UP SW331
RESOLUTION SW304
DIRECTORY PROGRAM SW308
HELP SW312
FLASH SW316
4 SW320
5 SW324
6 SW328
FILM REMAINING SW332
R349 NC
R350 NC
R351 NC
R352 NC
R353 NC
R354 NC
R355 NC
R356 NC
+5V
LCD CONTRAST
R321 NC
R322 1k
C321 NC
C322 0.1μ
R323 27k
0V LED: ON
5V LED: OFF
C329 NC
C328 NC
C327 NC
C326 NC
C325 NC
C324 NC
C323 NC
C331 0.1μ
to LCD
CN502
GND
+5V
VO
RS
R/W
E
D4
D5
D6
D7
R385 100
R381 56k
PI301
PI302
PI303
R382 330
R383 330
R384 330
DOCUMENT TOP SENSOR
DOCUMENT SET SENSOR
COVER SENSOR
R332 470
R333 470
R334 470
LED301 DIGITAL SP-PHONE
TAD/FAX ON LED302
LED303 PLAY MESSAGE
R361 180
R362 180
C332 0.1
R366 180
R365 10K
RECORD SW337
D364
D363
IQ-FAX SW333
CALLER ID SEARCH SW335
PLAY MESSAGE SW334
ERASE SW336
R363 10k
R364 10K
( ): NOT USED
R391
R392 0
R393 NC
R394 NC
R395 NC

KX-FP270 **KX-FP270**

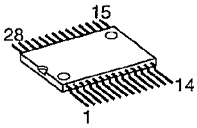
SCHEMATIC DIAGRAM/PRINTED CIRCUIT BOARD (SENSOR)


1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H
(COMPONENT VIEW)
MOTOR DRIVE
+5V
+24V
-24V
D401
Q401
R401 820
R402 3.3K
CN401
RXCOM
RX0
RX1
RX2
RX3
D405
D402 20V
IC401
PG
COM
GND
CN403
RXE
C401
35V 22U
CN402
CN404
F401
125V 250mA
R403 820
R404 3.3K
Q402
D403
IC402
D404 20V
D406
CN405
TX0
TX1
TX2
TX3
TX4
TXCOM
PAPER FULL SENSOR
CN407
PI403
FILM END SENSOR
CN408
C402 NC
SW401
HOOK SWITCH
CN406
PI402
PAPER TOP SENSOR
PFUP1097Z-A
RX-MOTOR
TX-MOTOR
AUTO-CH
ECT-CH
PFUP1097Z-C
FILM-END
PFUP1097Z-D
HOOK SW
PFUP1097Z-B
PAPER-TOP

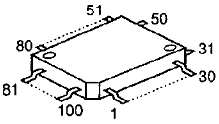
TERMINAL GUIDE OF THE IC'S TRANSISTORS AND DIODES



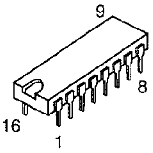
PFVIS80842AN



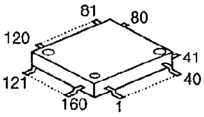
PFVIM4480CF


51
50
80
31
30
81
100
1

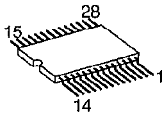
PFVIR667555



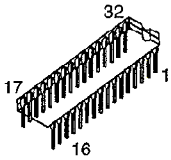
PQVIBA12003


81
80
120
41
40
121
160
1

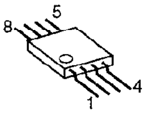
PFVIM66395M1



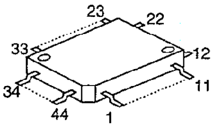
PFVIGM6256FF



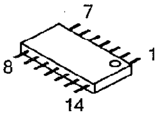
PFWIFP270M



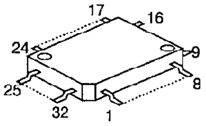
PQVINJM2113M
PQVINJM4558M
PFVINJM4558M


23
22
33
12
34
11
44
1

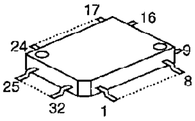
MN53007QAF



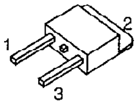
PQVITC4066BF


17
16
24
9
25
8
32
1

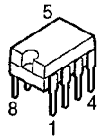
PFVIR10485


17
16
24
9
25
8
32
1

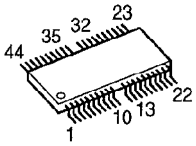
AN6382NFA



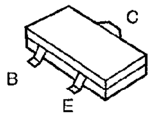
PFVIMC78M05C



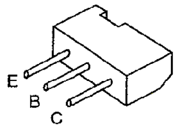
PFVIFA5317P


23
35
32
44
22
10
13
1

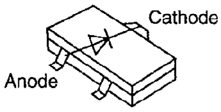
PFVIKM29N04T



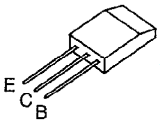
PQVTDTC143E
PQVTDTC114EU
2SB1197K, 2SB1218A,
2SD1819A, 2SB709A



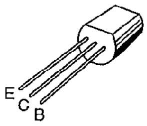
2SB1322, 2SD1921Q


Cathode
Anode

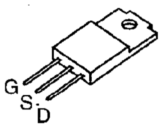
MA141WK



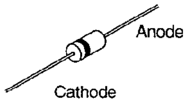
2SA1627



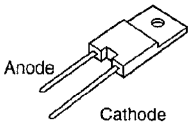
2SC2235



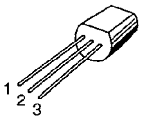
PQVTFS10KM10


Anode
Cathode

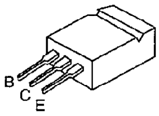
PQVDERA1802
PFVDAG01A


Anode
Cathode

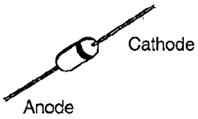
PFVDSF5LC20U



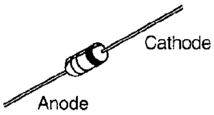
AN1431T



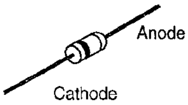
2SD2136


Cathode
Anode

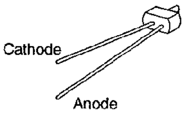
1SS119


Cathode
Anode

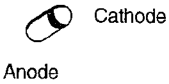
PQVDHZS2B1, MA4056


Anode
Cathode

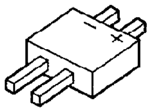
PFVDD1N4005
MA4220, PFVDD1NL20U
MA7200, 1SS147


Cathode
Anode

PQVDR325CA47

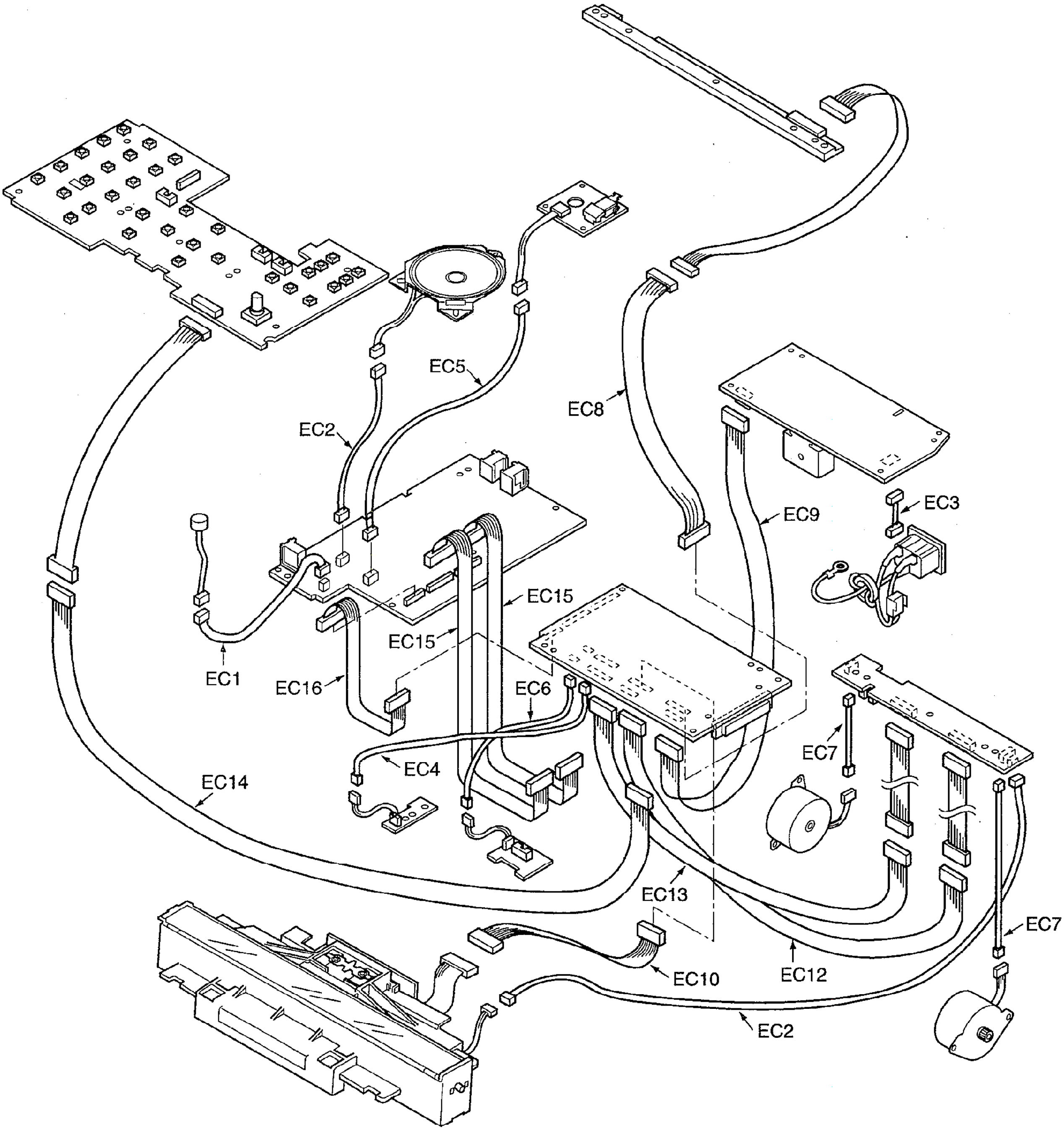

Cathode
Anode

RLS71



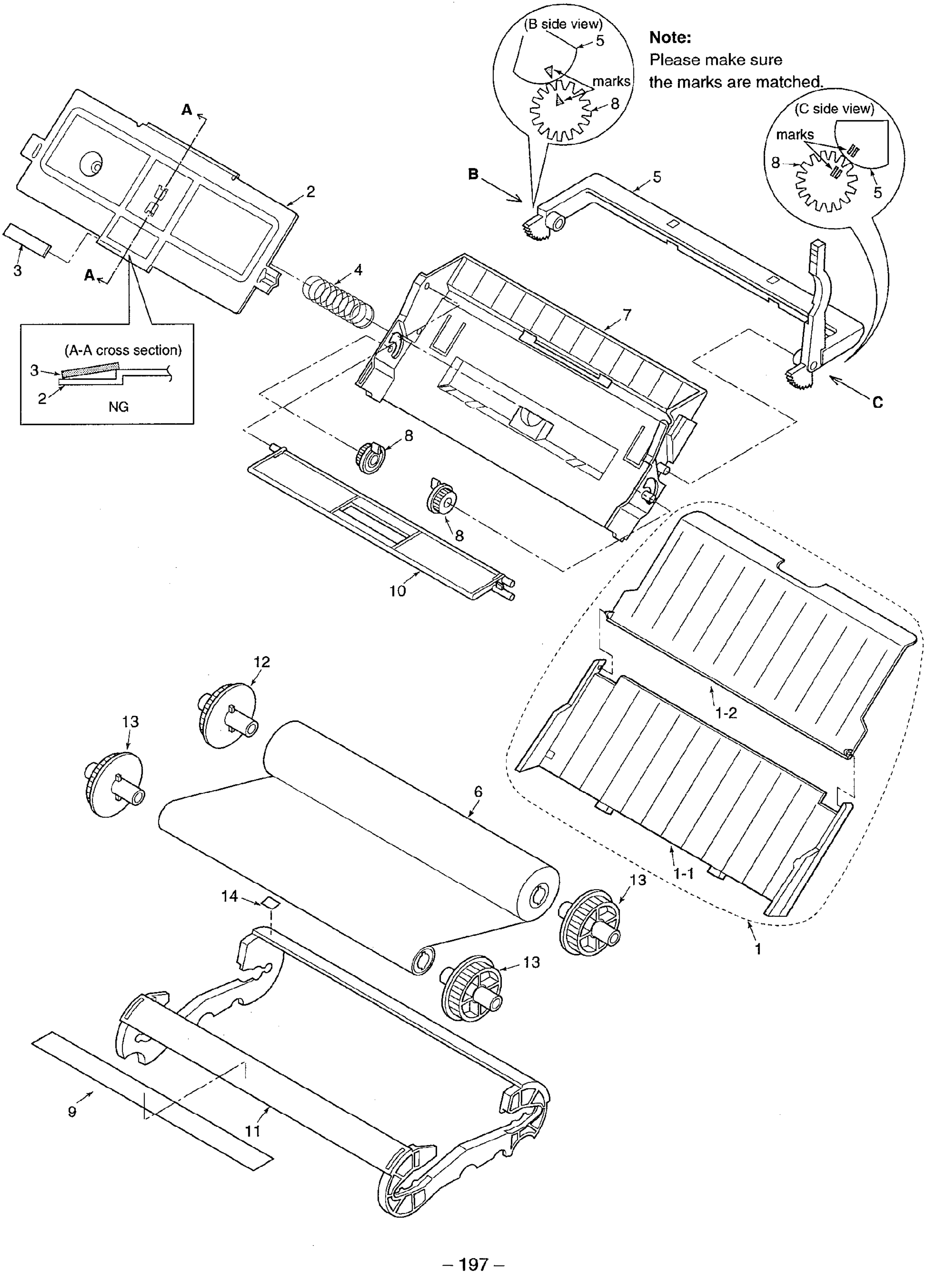
PQVDS1ZB40F1

FIXTURES AND TOOLS


EC5
EC8
EC2
EC3
EC9
EC15
EC15
EC1
EC16
EC6
EC4
EC7
EC14
EC13
EC7
EC10
EC12
EC2

CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

1. PAPER CASSETTE SECTION


(B side view)
5
marks
8
(C side view)
marks
8
5
A
A
B
C
1
1-1
1-2
2
3
4
5
6
7
8
8
9
10
11
12
13
13
13
14
(A-A cross section)
3
2
NG

Note:
Please make sure
the marks are matched.

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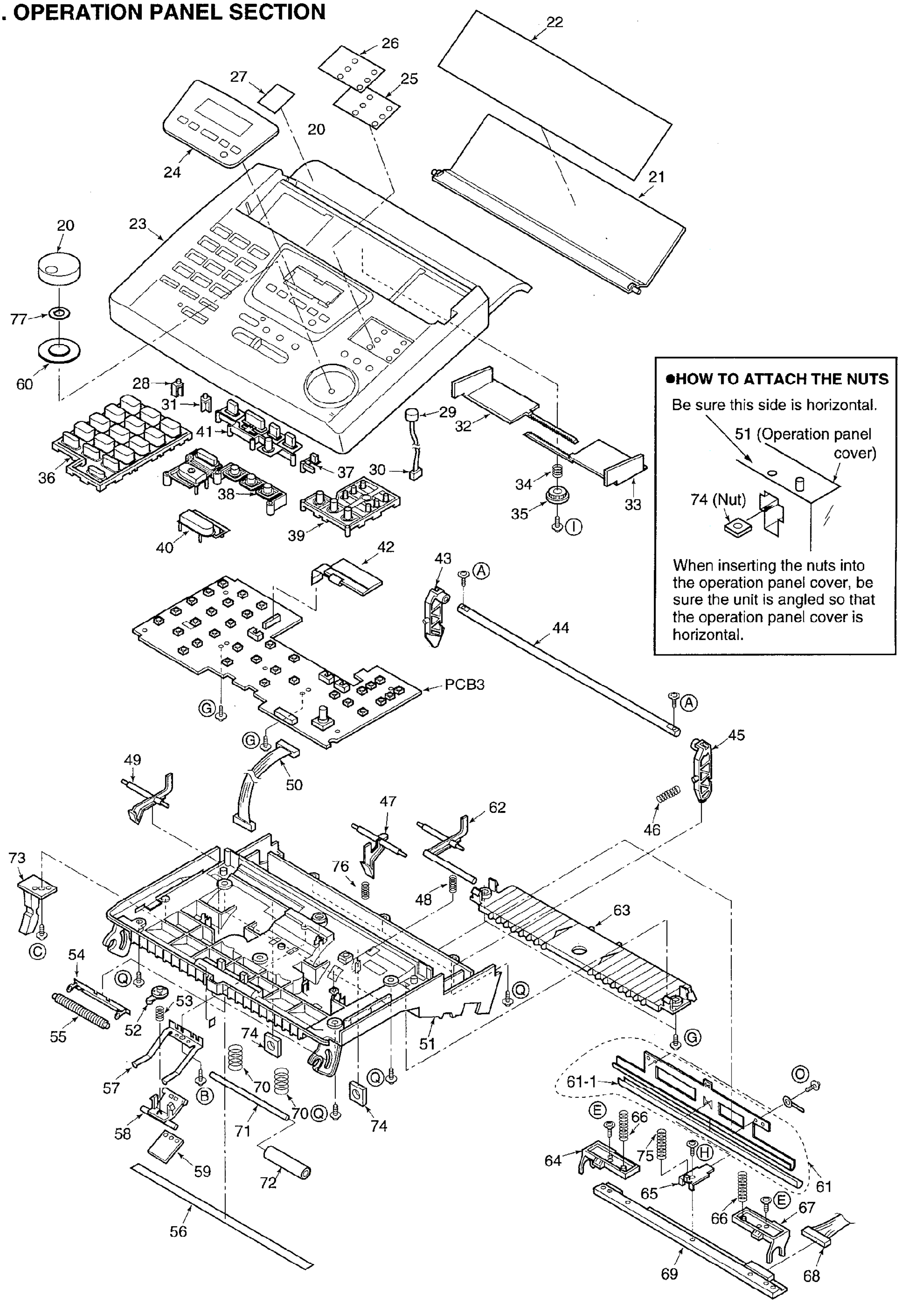
2. OPERATION PANEL SECTION

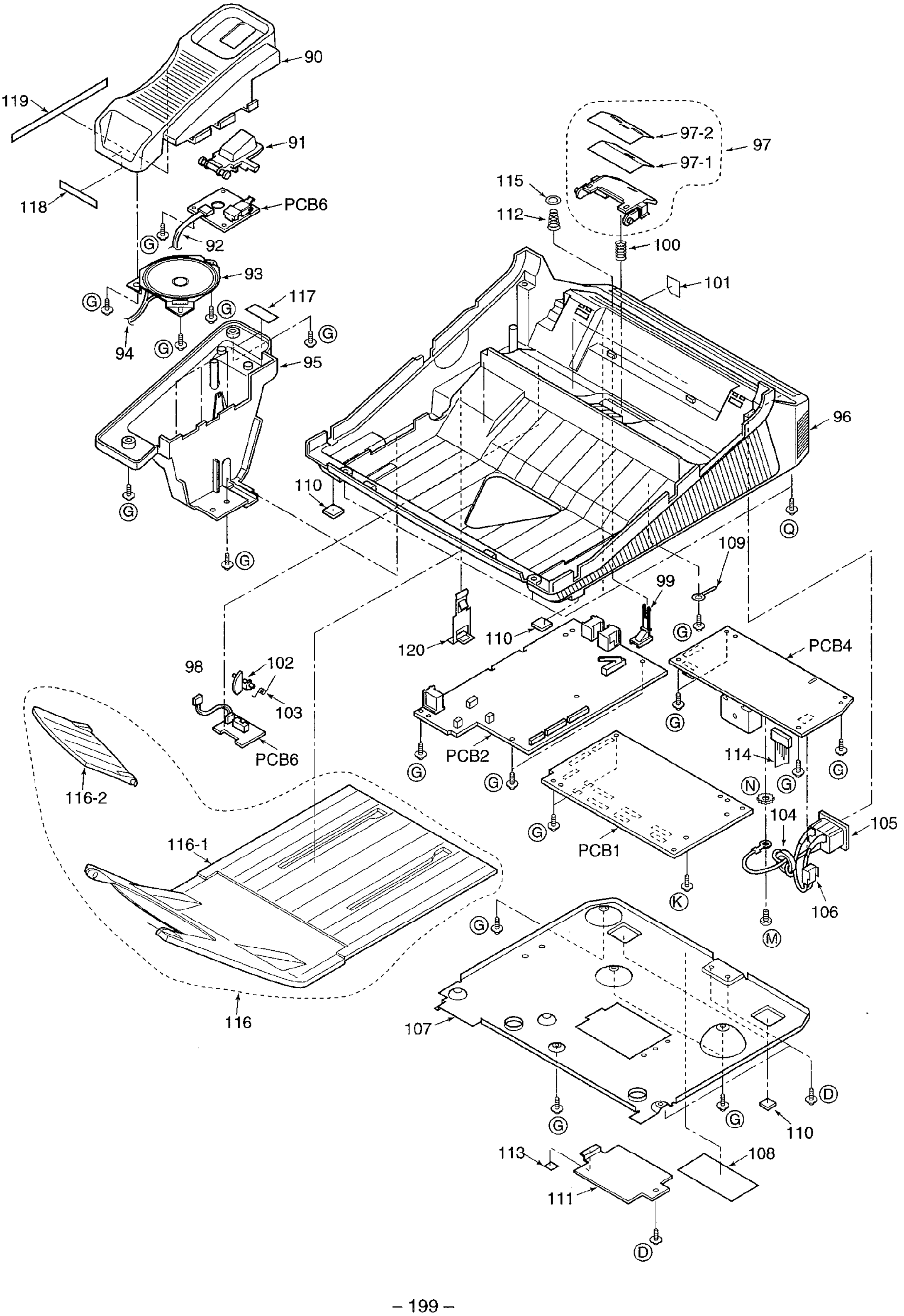

22
26
27
25
20
24
21
20
23
77
60
28
31
41
36
29
32
33
34
35
Ⓘ
37
30
38
39
40
42
43
Ⓐ
44
PCB3
Ⓐ
Ⓖ
Ⓖ
45
49
50
47
62
46
73
76
48
63
Ⓒ
54
Ⓠ
53
52
55
Ⓠ
51
74
Ⓖ
57
Ⓑ
70
Ⓠ
70
Ⓠ
74
61-1
Ⓞ
Ⓔ
66
58
71
64
75
Ⓗ
59
72
65
61
66
Ⓔ
67
56
69
68
51 (Operation panel cover)
74 (Nut)

●HOW TO ATTACH THE NUTS

Be sure this side is horizontal.

When inserting the nuts into the operation panel cover, be sure the unit is angled so that the operation panel cover is horizontal.

3. UPPER CABINET/P.C.B. SECTION


90
119
91
118
PCB6
115
97-2
97
97-1
112
100
92
93
101
117
94
95
96
110
Q
109
99
G
PCB4
120
110
98
102
103
PCB6
PCB2
114
N
104
105
116-2
116-1
PCB1
K
106
M
107
116
D
110
113
108
111
D

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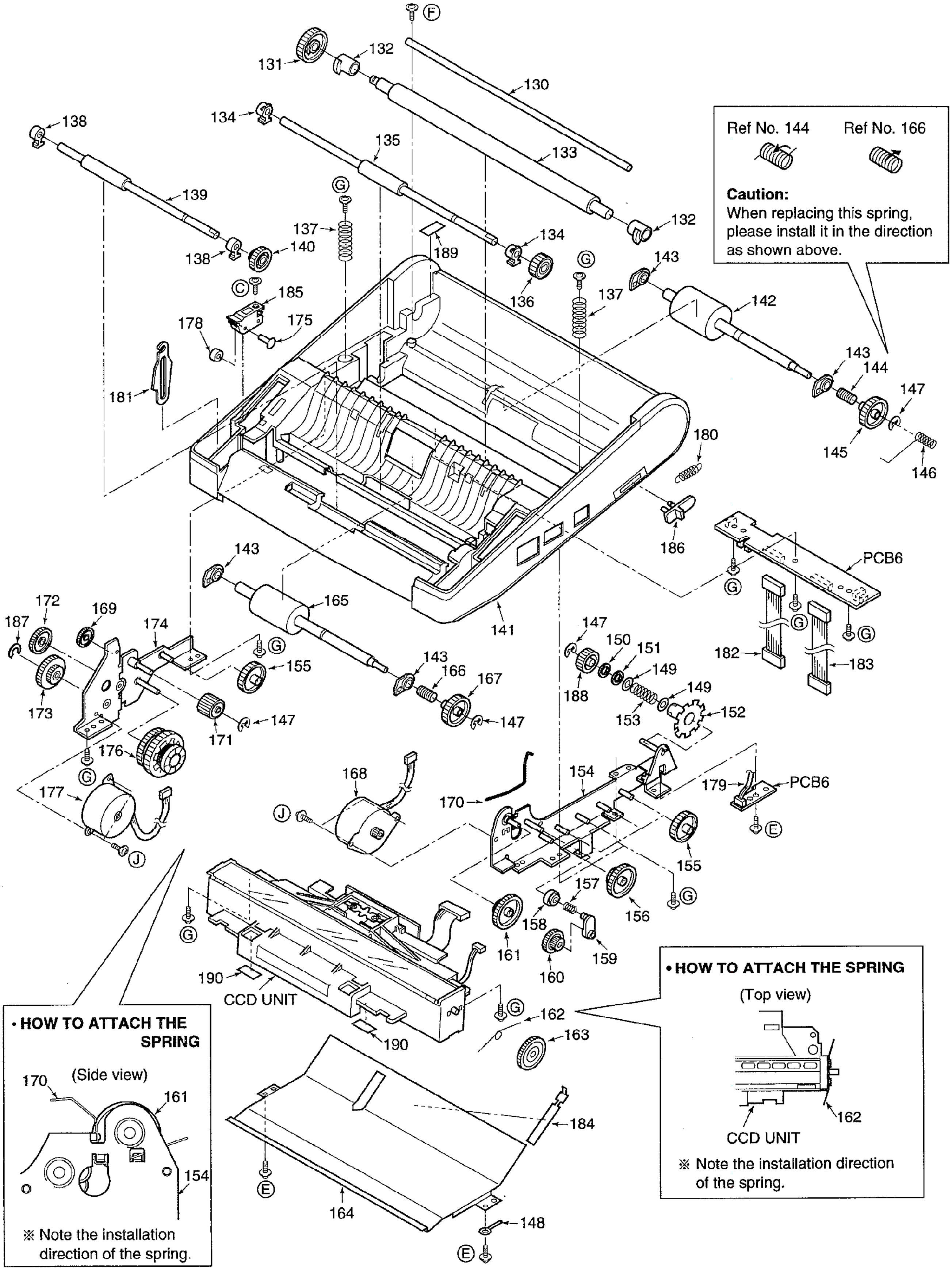
4. MECHANICAL SECTION


F
131
132
130
134
138
135
133
139
G
137
132
189
134
138
140
136
G
143
137
C
185
142
178
175
181
143
144
147
180
145
146
186
PCB6
143
G
165
141
172
169
187
174
147
G
150
151
182
183
G
G
155
143
166
149
173
167
188
149
147
147
153
152
171
176
G
168
154
177
170
179
PCB6
J
E
J
155
157
G
156
G
158
161
159
190
160
G
CCD UNIT
162
163
190
184
E
164
148
E
HOW TO ATTACH THE SPRING
(Side view)
170
161
154
HOW TO ATTACH THE SPRING
(Top view)
162
CCD UNIT
Ref No. 144
Ref No. 166

Caution:
When replacing this spring, please install it in the direction as shown above.

• HOW TO ATTACH THE SPRING

※ Note the installation direction of the spring.

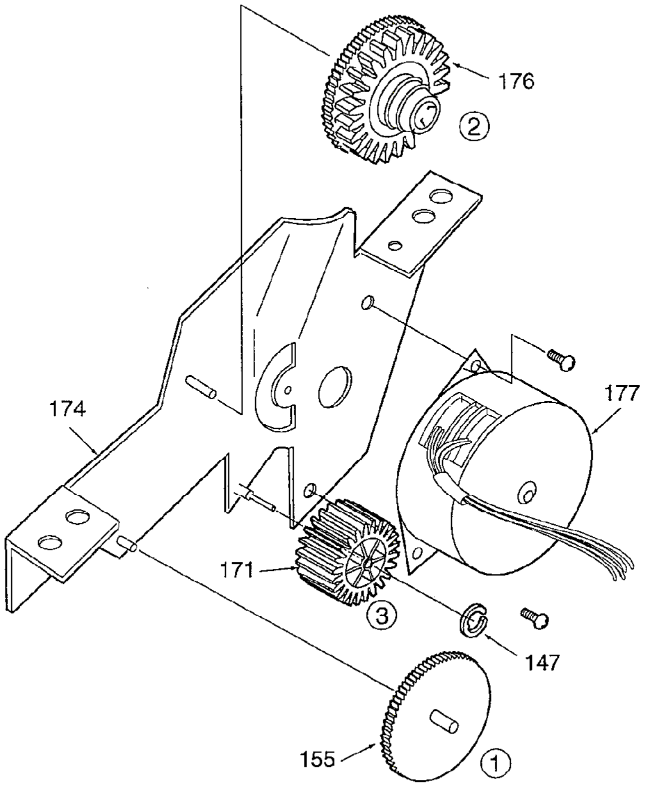
• HOW TO ATTACH THE SPRING

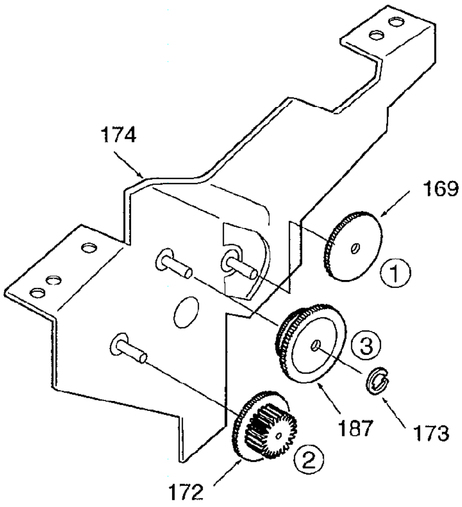
※ Note the installation direction of the spring.

•HOW TO ATTACH THE GEARS

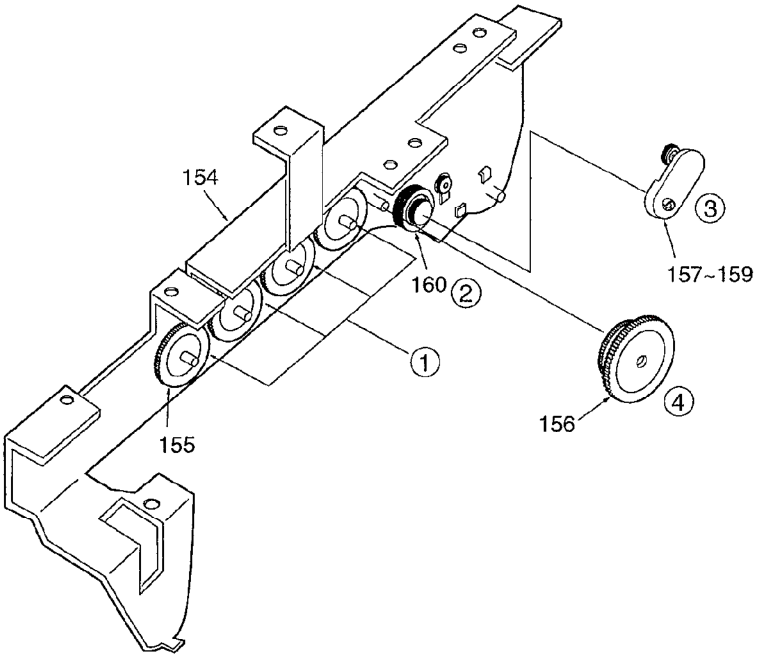
Attach the gears in the order as shown below.

(RX GEARS)


176
②
177
174
171
③
147
155
①


174
169
①
③
187
173
172
②

(TX GEARS)


154
③
157~159
160 ②
①
155
156
④

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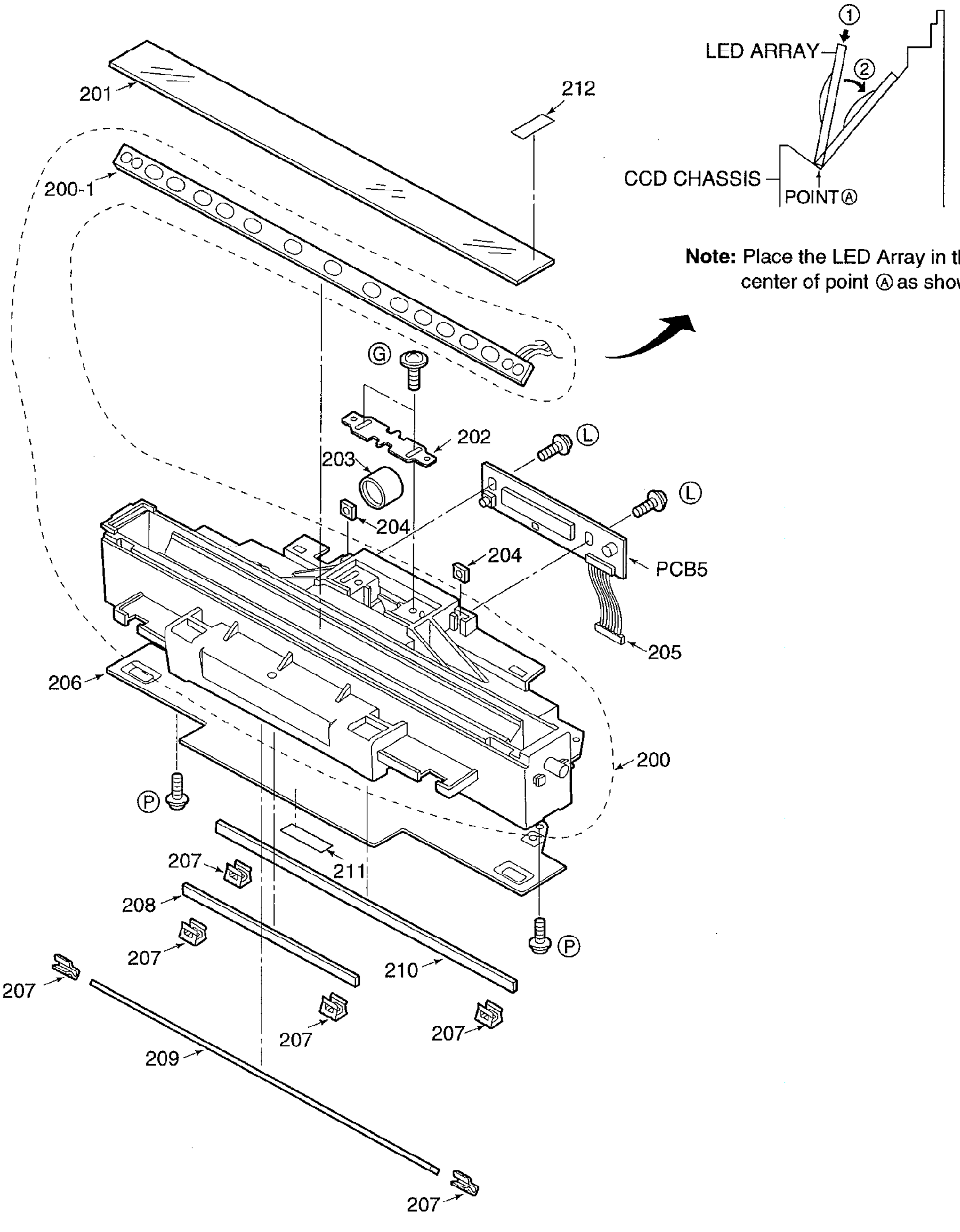
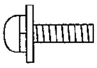
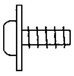
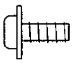
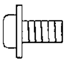
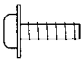
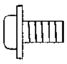
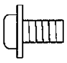
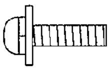
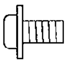
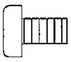
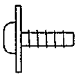
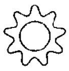
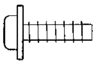
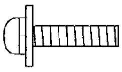
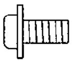
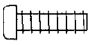
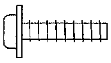
5. CCD UNIT SECTION



①
LED ARRAY
②
CCD CHASSIS
POINT Ⓐ
201
212
200-1
Ⓖ
202
203
Ⓛ
Ⓛ
204
204
PCB5
205
206
200
Ⓟ
Ⓟ
207
211
208
207
210
207
207
207
209
207

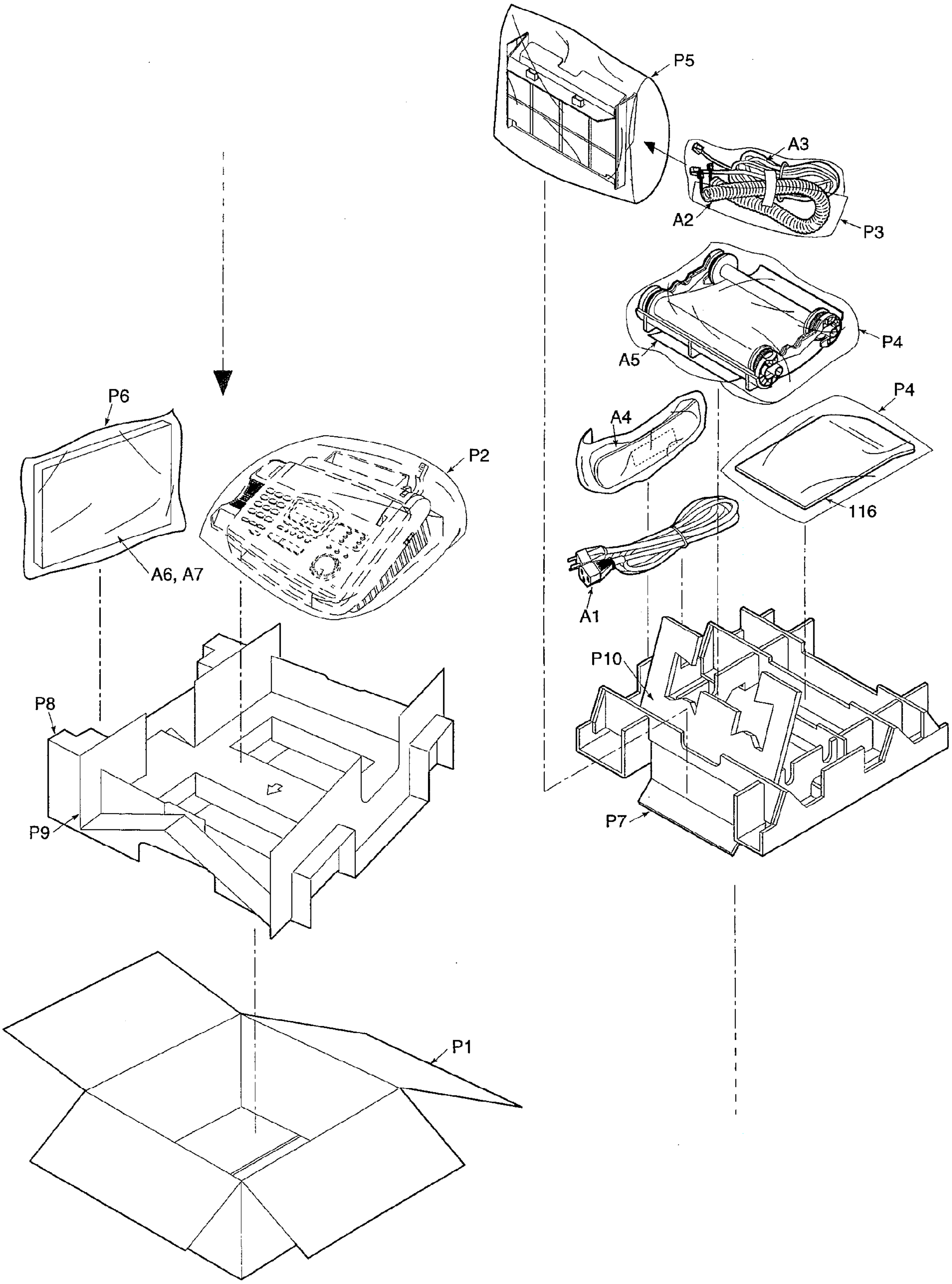
Note: Place the LED Array in the center of point Ⓐ as shown above.

6. ACTUAL SIZE OF SCREWS AND WASHER

Ref. No.	Part No.	Figure	Ref. No.	Part No.	Figure
Ⓐ	XYN3+F8		Ⓘ	XTW3+W6P	
Ⓑ	XTW3+S6PR		Ⓙ	XTW3+6L	
Ⓒ	XTW3+S8PFZ		Ⓚ	XTW3+U6L	
Ⓓ	XTW3+U6LFZ		Ⓛ	XYN3+F10	
Ⓔ	XTW3+U6L		Ⓜ	XSB4+6	
Ⓕ	XTW3+W8P		Ⓝ	XWC4B	
Ⓖ	XTW3+S10P		Ⓛ	XYN3+F12	
Ⓗ	XTW3+5LR		Ⓟ	XTB3+10G	
			Ⓠ	XTW3+S12P	

KX-FP270

ACCESSORIES AND PACKING MATERIALS



P5
A3
A2
P3
P4
A5
P4
P6
A4
P2
116
A6, A7
A1
P10
P8
P9
P7
P1

REPLACEMENT PARTS LIST

This replacement parts list is for KX-FP270 only. Refer to the simplified manual (cover) for other areas.

Model KX-FP270

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.
2. Important safety notice.
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms (Ω) k=1000Ω, M=1000kΩ
   All capacitors are in MICRO FARADS(μF) P= μμF
   *Type &Wattage of Resistor

Type

ERC:Solid	ERX:Metal Film	PQRD:Carbon
ERD:Carbon	ERG:Metal Oxide	PQRQ:Fuse
PQ4R:Chip	ERO:Metal Film	ERF:Wire Wound

Wattage

10,16,18:1/8W	14,25,S2:1/4W	12,50,S1:1/2W	1:1W	2:2W	5:5W

ECFD:Semi-Conductor	ECCD,ECKD,PQCBC,PQVP : Ceramic
ECQS:Styrol	ECQM,ECQV,ECQE,ECQU,ECQB : Polyester
PQCBX,ECUV:Chip	ECEA,ECSZ,ECOS : Electrolytic
ECMS:Mica	ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	OF:3.15V	OJ :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		OJ:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description	Pcs
		CABINET AND ELECTRICAL PARTS	
1	PFYEFP200M	PAPER TRAY ASS'Y	1
1-1	PFYE2FP200M	SUB PAPER TRAY ASS'Y	1
1-2	PFKS1013Z1	TRAY S	1
2	PFMD1026Z	COVER, PAPER CASSETTE	1
3	PFHG1032Z	RUBBER PARTS, CASSETTE SEP.	1
4	PFUS1087Z	SPRING, CASSETTE TRAY	1
5	PFDE1041Z3	LEVER, CASSETTE LOCK S	1
6	PFPE1031Z	INK FILM (20m) S	1
7	PFKS1011X1	PAPER CASSETTE S	1
8	PFDG1034Z	GEAR, GEAR	2
9	PFQT1258Y	INDICATION LABEL	1
10	PFKK1004Z	AHUTTER	1
11	PFHR1043Z1	RIBBON CASSETTE S	1
12	PFDG1038Z1	GEAR	1
13	PFDG1037Z	GEAR	3
14	PFQT1221Z	INDICATION LABEL	1
		(2.OPERATION PANEL SECTION)	
20	PFBE1002Z4	BUTTON, JOG DIAL	1
21	PFKS1018Z1	DOCUMENT TRAY	1
22	PFQT1451Z	INDICATION LABEL	1
23	PFGG1025X1	OPERATION PANEL GRILLE S	1
24	PFGP1102Z	LCD PANEL	1
25	PFGD1035Z	TEL. NO. CARD	1
26	PFGV1004Z	TRANSPARENT PLATE	1
27	PQQT11004Z	INDICATION LABEL	1
28	PFGP1091Z	LED COVER	1
29	PQJM128Z	MICROPHONE	1
30	PFJS02Q09Z	CONNECTOR, 2 PIN	1
31	PFGP1090Z	LED COVER	1
32	PFKR1010Z2	DOCUMENT GUIDE-L	1
33	PFKR1011Z2	DOCUMENT GUIDE-R	1
34	PFUS1034Z	SPRING	1
35	PFDG1002Z	GEAR	1
36	PFBX1041Z1	BUTTON, DIAL	1
37	PFBC1021Z1	BUTTON, HELP	1
38	PFBX1040Y1	BUTTON, STOP	1
39	PFBX1043Z1	BUTTON, ONE TOUCH	1
40	PFBC1020Z1	BUTTON, START	1
41	PFBX1044Z1	BUTTON, FAX SAVE	1
42	PFAVJS10401	LIQUID CRYSTAL DISPLAY S	1
43	PFDE1037Z	LEVER, LOCK-L	1
44	PFDF1016Z	SHAFT, LOCK	1
45	PFDE1067Z	LEVER, LOCK-R	1
46	PFUS1080Z	SPRING, LOCK LEVER	1
47	PFDE1069Z	LEVER, DOCUMENT DETECTION	1
48	PFUS1027Z	SPRING, DOCUMENT LEVER	1
49	PFDE1020Z	LEVER, READ DETECTION	1
50	PFJS11Q06Z	CONNECTOR, 11 PIN	1
51	PFUV1014Y	COVER, OPERATION PANEL S	1
52	PFHR1019Z	LEVER, SEP. SPRING ADJUST	1
53	PFUS1121Z	SPRING, DOCUMENT FEED	1
54	PFUS1026Y	SPRING, SUPPORT ROLLER	1
55	PQDR10005Y	ROLLER	1
56	PFHX1081Z	COVER, READING SHEET	1
57	PFUS1082Z	SPRING, DOCUMENT FEED	1
58	PFHR1081Z	GUIDE, SEPARATION RUBBER	1
59	PFHG1020Z	RUBBER PARTS, SEPARATION	1
60	PFHX1199Z	COVER, JOG SHEET	1
61	PFZU2FP200M	RIBBON GUIDE ASS'Y	1
61-1	PFHX1115Z	PLASTIC, RIBBON GUIDE	1
62	PFDE1043Y	LEVER, OPEN SENSOR S	1
63	PFKF1009Z1	CABINET, OPE. SUB COVER S	1
64	PFDE1034Y	GUIDE, HEAD HOLDER	1
65	PFMH1038Z	ANGLE, HEAD FULCRUM	1
66	PFUS1083Z	SPRING, THERMAL HEAD	2
67	PFDE1035Y	GUIDE, HEAD HOLDER	1
68	PFJS12Q03Z	CONNECTOR, 12 PIN	1
69	PFJHS013Z	THERMAL HEAD S	1
70	PFUS1025Z	SPRING, ROLLER	2
71	PFDF1005Z	SHAFT, SUPORT ROLLER S	1
72	PQDR9685Y	ROLLER, SUPPORT S	1
73	PFHR1047Y	ARM, DUMPER	1
74	PFHE1004Z	NUT,STEEL	2
75	PFUS1088Z	SPRING, THERMAL HEAD	1
76	PFUS1109Z	SPRING, DOCUMENT LEVER	1
77	PFHX1212Z	JOG DIAL SHEET	1

This replacement parts list is for KX-FP270 only. Refer to the simplified manual (cover) for other areas.

Ref. No.	Part No.	Part Name & Description	Pcs
		(3. UPPER CABINET/P.C.B. SECTION)	
90	PFKM1014Y1	CABINET COVER, H/S CRADLE S	1
91	PFBH1004Y1	BUTTON, HOOK S	1
92	PFJS03Q05Z	CONNECTOR, 3 PIN	1
93	PQAS5P13Y	SPEAKER	1
94	PFJS02R54Z	CONNECTOR, 2 PIN	1
95	PFKM1015Z1	CABINET BASE, H/S CRADLE S	1
96	PFKF1024W1	CABINET, BASE S	1
97	PFZEFP250M	P. SEPARATION HOLDER ASS'Y	1
97-1	PFHG1045Z	RUBBER, PAPER SEPARATION	1
97-2	PFHX1114Z	SEPARATION SHEET	1
98	PFJS03R52Z	CONNECTOR, 3 PIN	1
99	PFDE1042Z	LEVER, PAPER LOCK SENSOR	1
100	PFUS1068Z	SPRING, P. SEPARATION	1
101	Not Used		
102	PQDE10055Z	LEVER, PAPER TOP SENSOR	1
103	PFUS1076Z	SPRING, PAPER TOP	1
104	PQLB1E1	FERRITE CORE S	1
105	PQJP03S07Z	CONNECTOR, 3 PIN ⚠	1
106	PQJS02Q59Y	CONNECTOR, 2 PIN	1
107	PFMD1017Y	COVER, BASE	1
108	PFGT1352Z	NAME PLATE,AL	1
109	PQHM112Z	CLAMPER	1
110	PFHA1001Z	RUBBER PARTS, LEG S	4
111	PQHM171Z	DOOR LID, ROM COVER	1
112	PFUS1086Z	SPRING, PAPER SEPARATION	1
113	PFHX1142Z	RIBBON GUIDE SHAFT SHEET	1
114	PFJS09Q04Z	CONNECTOR, 9 PIN	1
115	PFNW1002Z	WASHER	1
116	PFZE1FP250M	DOCUMENT TRAY ASS'Y	1
116-1	PFKS1020Z1	DOCUMENT TRAY	1
116-2	PFKS1021Z1	SUB DOCUMENT TRAY	1
117	PFHX1171Z	VIBRATION SHEET	4
118	PFHX1148Z	VIBRATION SHEET	1
119	PFHX1170Z	VIBRATION SHEET	1
120	PFUS1081X,	SPRING, RX EARTH	1
		(4. MECHANICAL SECTION)	
130	PFDF1018Z	SHAFT, RIBON GUIDE	1
131	PFDG1027Y	GEAR, PLATEN DRIVE	1
132	PFDJ1011Z	SPACER, PLATEN	2
133	PFDN1010Z	ROLLER, PLATEN	1
134	PFDJ1007Z	SPACER, ROLLER	2
135	PFDN1006Z	ROLLER, DOCUMENT FEED	1
136	PFDG1004Z	GEAR, DOCUNENT FEED	1
137	PFUS1073Z	SPRING, POP UP	2
138	PFDJ1006Z	SPACER, ROLLER	2
139	PFDN1005Z	ROLLER, DOCUMENT FEED	1
140	PFDG1003Z	GEAR, DOCUMENT FEED ROLLER	1
141	PFKM1033Z1	CABINET, MAIN S	1
142	PFDN1011Z	ROLLER, PICK UP	1
143	PQDJ10002Z	SPACER, ROLLER	4
144	PFUS1067Z	SPRING, CLUTCH	1
145	PFDG1074Z	GEAR, PICK UP ROLLER	1
146	PFUS1122Z	SPRING, EARTH	1
147	XUC2FY	RETAINING RING	4
148	PQHM112Z	CLAMPER	1
149	PFNW1003Z	WASHER	2
150	PFHG1030Z	RUBBER PARTS	1
151	XWE5VW	WASHER	1
152	PFDG1036Z	GEAR, ENCORDER	1
153	PFUS1065Z	SPRING, BACK TENSION	1
154	PFUA1009Y	CHASSIS, TX GEAR	1
155	PFDG1032Y	GEAR, IDLER	5
156	PFDG1033Y	GEAR, IDLER	1
157	PFUS1019Z	SPRING, THRUST	1
158	PFDG1005Z	GEAR, CHANGEOVER	1
159	PFDE1014Z	ARM, CHANGEOVER	1
160	PFDG1009Z	GEAR, IDLER	1
161	PFDG1008Z	GEAR, IDLER	1
162	PFUS1017Y	SPRING, STATIC ELECTRIC	1
163	PFDG1007Z	GEAR, IDLER	1
164	PFMD1016Y	COVER, MAIN S	1
165	PFDN1004Z	ROLLER, SEPARATION	1
166	PQUS10055Z	SPRING, ONE WAY	1
167	PFDG1012Z	GEAR, SEPARATION ROLLER	1
168	PFJQ1011Z	TX MOTOR	1
169	PFDG1031Y	GEAR, IDLER	1
170	PFUS1018X	SPRING, STATIC ELECTRIC	1
171	PFDG1039Y	GEAR, RIBBON DRIVE S	1
172	PFDG1076Z	GEAR, IDLER	1
173	PFDG1075Z	GEAR, IDLER	1
174	PFUA1013Z	CHASSIS, RX GEAR	1
175	PFDF1019Y	SHAFT, PARALELL PIN	1
176	PFDX1008Z	GEAR, WIND TORQUE LIMITER	1
177	PFJQ1010Z	RX MOTOR	1
178	PFDR1008Z	ROLLER, DUMPER	1
179	PFJS03R57Z	CONNECTOR, 3 PIN	1
180	PFUS1071Z	SPRING, OPEN BUTTON	1
181	PFHR1048Z	ARM, STOPPER	1
182	PFJS06Q01Z	CONNECTOR, 6 PIN	1
183	PFJS09R56Z	CONNECTOR, 9 PIN	1
184	PFHX1139Z	COVER, ROLLING SHEET	1
185	PFHR1044Z	GUIDE, DUMPER HOLDER	1
186	PFYTFP200M	OPEN BUTTON ASS'Y	1
187	PQFN51Z	WASHER	1
188	PFDG1029Y	GEAR, RIBBON DRIVE S	1
189	PFQT1221Z	INDICATION LABEL	1
190	PFHX1171Z	COVER, VIBRATION SHEET	2
		(5. CCD UNIT SECTION)	
200	PFWLF780M	CHASSIS ASS'Y	1
200-1	PFVDSLA30222	LED ARRAY	1
201	PF0G1001Z	TARGET GLASS	1
202	PFUS1021Z	SPRING	1
203	PF0L1001Z	LENS	1
204	PFHE1004Z	NUT	2
205	PFJS08R58Z	CONNECTOR, 8P	1
206	PFMD1007Z	COVER	1
207	PFUS1028Z	SPRING	6
208	PF0M1003Z	MIRROR, SMALL	1
209	PF0M1001Z	MIRROR, LARGE	1
210	PF0M1002Z	MIRROR, MIDDLE	1
211	PFHX1141Z	SHEET	1
212	PFHX1215Z	SHEET	1

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Ref. No.	Part No.	Part Name & Description	Pcs
ACCESSORIES AND PACKING MATERIALS			
A1	PQJA200Z	POWER CORD ⚠	1
A2	PQJA212M	HANDSET CORD	1
A3	PQJA59V	TELEPHONE CORD ⚠S	1
A4	PFJXE0105Z	HANDSET ASS'Y	1
A5	PFQW1246Z	LEAFLET	1
A6	PFQX1197Z	INSTRUCTION BOOK	1
A7	PFQV1036Z	ADVANTAGE PROGRAM SHEET	1
P1	PFPK1366Z	GIFT BOX	1
P2	PFPH1008Z	PACKING SHEET	1
P3	XZB20X20A04	BAG,POLYETHYLENE	1
P4	XZB21X43A04	BAG,POLYETHYLENE	2
P5	XZB20X35A04	BAG,POLYETHYLENE	1
P6	XZB32X45A04	BAG,POLYETHYLENE	1
P7	PFPN1116Z	CUSHION, UPPER S	1
P8	PFPN1114Z	CUSHION S	1
P9	PFPN1115Z	CUSHION S	1
P10	PFPE1041Z	CUSHION, STOPPER S	1
DIGITAL BOARD PARTS			
PCB1	**PFWP1FP270M**	**DIGITAL BOARD ASS'Y (RTL)**	**1**
		(ICs)	
IC501	PFVIM66395M1	IC	1
IC502	PFWIFP270M	IC (ROM)	1
IC503	PFVIM4480CF	IC	1
IC504	PFVIGM6256FF	IC	1
IC505	PFVIR667555	IC	1
IC509	PFVIS80842AN	IC	1
IC510	PFVIMC78M05C	IC	1
IC511	PFVIMC78M05C	IC	1
IC513	PFVIKM29N04T	IC	1
IC514	PFVIR10485	IC	1
IC515	PQVINJM4558M	IC S	1
IC516	PQVINJM4558M	IC S	1
		(TRANSISTORS)	
Q503	PQVTDTC114EU	TRANSISTOR(SI) [OR UN5211]	1
Q505	PQVTDTC114EU	TRANSISTOR(SI) [OR UN5211]	1
Q506	2SD1819A	TRANSISTOR(SI) S [OR 2SC4155 OR 2SC4081]	1
Q507	2SB1197K	TRANSISTOR(SI) [OR 2SB1051K]	1
Q508	2SD1819A	TRANSISTOR(SI) S [OR 2SC4155 OR 2SC4081]	1
Q509	2SB1197K	TRANSISTOR(SI) [OR 2SB1051K]	1
Q510~512	2SD1819A	TRANSISTOR(SI) S [OR 2SC4155 OR 2SC4081]	3
Q513	2SB709A	TRANSISTOR(SI) [OR 2SB1051K OR 2SB1197K]	1
Q514	2SB709A	TRANSISTOR(SI) [OR 2SB1051K OR 2SB1197K]	1
Q515	2SD1819A	TRANSISTOR(SI) S	1
Q516	2SD1819A	TRANSISTOR(SI) S [OR 2SC4155 OR 2SC4081]	1
IC508	PFVTSI4431DY	TRANSISTOR(SI)	1
		(DIODES)	
D508	RLS71	DIODE(SI)	1
DA501	MA141WK	DIODE(SI)	1
		(BATTERY)	
BAT501	PQPCR2032H09	BATTERY S	1
		(CONNECTORS)	
CN501	PQJP12A19Z	CONNECTOR, 12 PIN	1
CN502	PQJP12A19Z	CONNECTOR, 12 PIN	1
CN503	PQJP07A19Z	CONNECTOR, 7 PIN	1
CN504	PQJP03G100Z	CONNECTOR, 3 PIN	1
CN505	PQJP3G30Y	CONNECTOR, 3 PIN	1
CN506	PQJP8G30Y	CONNECTOR, 8 PIN	1
CN507	PQJP11G30Y	CONNECTOR, 11 PIN	1
CN508	PQJP12G30Y	CONNECTOR, 12 PIN	1
CN510	PQJP9G30Y	CONNECTOR, 9 PIN	1
CN511	PQJP06G100	CONNECTOR, 6 PIN	1
CN512	PQJP09G100Z	CONNECTOR, 9 PIN	1
		(COILS)	
L509~520	PQLQR1RM601	COIL	12
L522	PQLQR1ET	COIL	1
L523	PQLQR1RM601	COIL	1
L524	PQLQR1ET	COIL	1
L525	PQLQR2N2R7K	COIL	1
R519	PQLQR1RM601	COIL	1
		(COMPONENTS PARTS)	
RA501~ RA504	EXRV8V271JV	COMPONENTS PARTS	1
RA505~ RA508	EXRV8V101JV	COMPONENTS PARTS	1
		(CERAMIC FILTERS)	
LF501	EXCEMT222D	CERAMIC FILTER	1
		(FUSE)	
F501	XBAPF001312	FUSE	1
		(CRYSTAL OSCILLATORS)	
X501	PFVCCFS32Z	CRYSTAL OSCILLATOR	1
X502	PFVCCSA24Z	CRYSTAL OSCILLATOR	1
X503	PFVC5376Z	CRYSTAL OSCILLATOR	1

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Ref. No.	Part No.	Value	Pcs
		(RESISTORS)	
L521	ERJ3GEY0R00	0	1
R505	ERJ3GEYJ101	100	1
R506	ERJ3GEYJ101	100	1
R507	ERJ3GEYJ101	100	1
R508	ERJ3GEYJ271	270	1
R509	ERJ3GEYJ101	100	1
R510	ERJ3GEYJ101	100	1
R511	ERJ3GEYJ223	22K	1
R512	ERJ3GEYJ823	82K	1
R515	ERJ3GEYJ102	1K	1
R516	ERJ3GEYJ102	1K	1
R517	ERJ3GEYJ101	100	1
R518	ERJ3GEYJ101	100	1
R520	ERJ3GEYJ101	100	1
R521	ERJ3GEYJ101	100	1
R522	ERJ3GEYJ101	100	1
R525	ERJ3GEYJ562	5.6K	1
R526	ERJ3GEYJ472	4.7K	1
R527	ERJ3GEYJ203	20K	1
R532	ERJ3GEYJ473	47K	1
R534	ERJ3GEYJ473	47K	1
R535	ERJ3GEY0R00	0	1
R537	ERJ3GEYJ103	10K	1
R539	ERJ3GEYJ472	4.7K	1
R540	ERJ3GEY0R00	0	1
R541	ERJ3GEYJ153	15K	1
R542	ERJ3GEYJ103	10K	1
R543	ERJ3GEY0R00	0	1
R544	ERJ3GEYJ472	4.7K	1
R545	ERJ3GEY0R00	0	1
R547	ERJ3GEYJ271	270	1
R548	ERJ3GEYJ271	270	1
R549	ERJ3GEYJ271	270	1
R550	ERJ3GEY0R00	0	1
R551	ERJ3GEYJ101	100	1
R552	ERJ3GEYJ472	4.7K	1
R553	ERJ3GEYJ101	100	1
R555	ERJ3GEYJ101	100	1
R556	ERJ3GEYJ101	100	1
R557	ERJ3GEY0R00	0	1
R558	ERJ3GEYJ472	4.7K	1
R559	ERJ3GEY0R00	0	1
R560	ERJ3GEY0R00	0	1
R561	ERJ3GEYJ101	100	1
R562	ERJ3GEYJ101	100	1
R563	ERJ3GEYJ103	10K	1
R566	ERJ3GEYJ101	100	1
R567	ERJ3GEYJ101	100	1
R568	ERJ3GEYJ101	100	1
R570	ERJ3GEYJ101	100	1
R571	ERJ3GEYJ270	27	1
R572	ERJ3GEYJ105	1M	1
R574	ERJ3GEYJ222	2.2K	1
R575	ERJ3GEYJ122	1.2K	1
R576	ERJ3GEYJ221	220	1
R577	ERJ3GEYJ472	4.7K	1
R578	ERJ3GEYJ122	1.2K	1

Ref. No.	Part No.	Value	Pcs
R579	ERJ3GEYJ821	820	1
R580	ERJ3GEYJ103	10K	1
R581	ERJ3GEYJ472	4.7K	1
R582	ERJ3GEYJ912	9.1K	1
R583	ERJ3GEYJ223	22K	1
R584	ERJ3GEYJ104	100K	1
R585	ERJ3GEYJ104	100K	1
R586	ERJ3GEYJ563	56K	1
R587	ERJ3GEYJ104	100K	1
R588	ERJ3GEYJ472	4.7K	1
R589	ERJ3GEYJ103	10K	1
R590	ERJ3GEYJ331	330	1
R591	ERJ3GEYJ103	10K	1
R592	ERJ3GEYJ103	10K	1
R593	ERJ3GEYJ103	10K	1
R594	ERJ3GEYJ331	330	1
R595	ERJ3GEYJ563	56K	1
R596	ERJ3GEYJ562	5.6K	1
R597	PQ4R10XJ270	27 S	1
R598	PQ4R10XJ330	33 S	1
R599	ERJ3GEYJ101	100	1
R600	ERJ3GEYJ103	10K	1
R601	ERJ3GEYJ563	56K	1
R602	ERJ3GEYJ563	56K	1
R603	ERJ3GEYJ332	3.3K	1
R604	ERJ3GEYJ103	10K	1
R605	ERJ3GEYJ103	10K	1
R606	ERJ3GEYJ472	4.7K	1
R607	ERJ3GEYJ103	10K	1
R608	ERJ3GEYJ103	10K	1
R609	ERJ3GEYJ393	39K	1
R610	ERJ3GEYJ393	39K	1
R611	PQ4R18XJ150	15	1
R612	ERJ3GEYJ393	39K	1
R613	ERJ3GEYJ393	39K	1
R614	ERJ3GEYJ683	68K	1
R615	ERJ3GEYJ103	10K	1
R616	ERJ3GEY0R00	0	1
R617	ERJ3GEYJ683	68K	1
R618	ERJ3GEYJ103	10K	1
R619	ERJ3GEYJ472	4.7K	1
R620	ERJ3GEYJ103	10K	1
R621	ERJ3GEYJ101	100	1
R622	ERJ3GEYJ101	100	1
R623	ERJ3GEYJ333	33K	1
R624	ERJ3GEYJ472	4.7K	1
R626	ERJ3GEYJ103	10K	1
R627	ERJ3GEYJ103	10K	1
R628	ERJ3GEYJ101	100	1
R629	ERJ8GEY0R00	0	1
R630	ERJ3GEYJ271	270	1
R631	ERJ3GEYJ271	270	1
R632	ERJ3GEYJ271	270	1
R633	ERJ3GEYJ271	270	1
R634	ERJ3GEYJ271	270	1
R635	ERJ3GEYJ271	270	1
R636	ERJ3GEYJ101	100	1
R638	ERJ3GEYJ184	180K	1

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Ref. No.	Part No.	Value	Pcs
R642	ERJ3GEY0R00	0	1
R643	ERJ3GEYJ103	10K	1
R644	PQ4R18XJ102	1K	1
R645	ERJ3GEYJ103	10K	1
R646	ERJ3GEYJ103	10K	1
R647	ERJ3GEYJ103	10K	1
		(CAPACITORS)	
C503	ECUV1H561JCV	560P	1
C507	PQCUV1H473MD	0.047	1
C510	ECUV1H222KBV	0.0022	1
C512	ECUV1C104KBV	0.1	1
C513	ECUV1H104ZFV	0.1 S	1
C515	ECUV1H102KBV	0.001	1
C516	ECUV1H102KBV	0.001	1
C521	ECUV1H102JCV	0.001	1
C522	ECUV1H104ZFV	0.1 S	1
C523	ECUV1H104ZFV	0.1 S	1
C524	ECUV1H104ZFV	0.1 S	1
C525	ECUV1C224ZFV	0.22	1
C526	ECUV1H104ZFV	0.1 S	1
C527	ECUV1H104ZFV	0.1 S	1
C528	ECUV1H104ZFV	0.1 S	1
C529	ECUV1H104ZFV	0.1 S	1
C530	ECUV1H120JCV	12P	1
C532	ECUV1H104ZFV	0.1 S	1
C533	ECUV1H104ZFV	0.1 S	1
C534	ECUV1H104ZFV	0.1 S	1
C535	ECUV1H150JCV	15P	1
C536	ECA0JM101	100	1
C537	ECUV1H104ZFV	0.1 S	1
C538	ECUV1H104ZFV	0.1 S	1
C543	ECUV1H104ZFV	0.1 S	1
C544	ECUV1H104ZFV	0.1 S	1
C545	ECUV1H104ZFV	0.1 S	1
C546	ECUV1H104ZFV	0.1 S	1
C547	ECUV1H104ZFV	0.1 S	1
C548	ECUV1H104ZFV	0.1 S	1
C549	ECA0JM101	100	1
C550	ECUV1H104ZFV	0.1 S	1
C551	ECUV1H104ZFV	0.1 S	1
C552	ECUV1H104ZFV	0.1 S	1
C553	ECUV1H104ZFV	0.1 S	1
C554	ECUV1C104KBV	0.1	1
C556	ECUV1H104ZFV	0.1 S	1
C562	ECUV1H120JCV	12P	1
C565	ECUV1H120JCV	12P	1
C566	ECUV1H080DCV	8P	1

Ref. No.	Part No.	Value	Pcs
C567	ECUV1H120JCV	12P	1
C568	ECUV1H104ZFV	0.1 S	1
C569	ECUV1H330JCV	33P	1
C570	ECUV1H104ZFV	0.1 S	1
C571	ECUV1C224ZFV	0.22	1
C572	ECUV1C224ZFV	0.22	1
C573	ECUV1C224ZFV	0.22	1
C574	ECUV1C224ZFV	0.22	1
C576	ECUV1H104ZFV	0.1 S	1
C578	ECUV1H333KDV	0.033 S	1
C579	ECUV1H104ZFV	0.1 S	1
C580	ECUV1H104ZFV	0.1 S	1
C581	ECUV1H472KBV	0.0047 S	1
C582	ECUV1H472KBV	0.0047 S	1
C583	PQCUV1H105JC	1 S	1
C584	PQCUV1H105JC	1 S	1
C585	ECA1CM100	10	1
C586	ECA1CM100	10	1
C587	ECA0JM221	220	1
C588	ECA0JM101	100	1
C589	ECUV1H104ZFV	0.1 S	1
C590	ECUV1H333KDV	0.033 S	1
C591	ECA0JM221	220	1
C592	ECUV1H104ZFV	0.1 S	1
C593	ECUV1H104ZFV	0.1 S	1
C594	ECUV1H104ZFV	0.1 S	1
C595	ECUV1H030CCV	3P S	1
C596	ECA1VM470	47	1
C597	ECUV1H080DCV	8P	1
C598	ECUV1H102JCV	0.001	1
C600	PQCUV1C224KB	0.22 S	1
C601	PQCUV1C224KB	0.22 S	1
C602	PQCUV1C224KB	0.22 S	1
C603	PQCUV1H105JC	1 S	1
C605	PQCUV1C224KB	0.22 S	1
C606	PQCUV1C224KB	0.22 S	1
C607	PQCUV1H104ZF	0.1	1
C608	ECUV1H331JCV	330P S	1
C609	ECUV1E273KBV	0.027	1
C611	ECUV1C104KBV	0.1	1
C612	ECUV1H104ZFV	0.1 S	1
C614	ECUV1H104ZFV	0.1 S	1
C615	ECUV1C104KBV	0.1	1
C618	ECUV1H102JCV	0.001	1
C619	ECA0JM221	220	1
C622	ECUV1H104ZFV	0.1 S	1
C623	PQCUV1H105JC	1 S	1
C624	PQCUV1H105JC	1 S	1
C625	ECA1CM100	10	1
C626	ECA1CM100	10	1
C627	ECUV1H104ZFV	0.1 S	1
C628	ECUV1H104ZFV	0.1 S	1
C629	ECUV1H120JCV	12P	1
C632	ECUV1H104MD	0.1 S	1

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Ref. No.	Part No.	Part Name & Description	Pcs
		ANALOG BOARD PARTS	
PCB2	**PFLP1141MZ**	**ANALOG BOARD ASS'Y (RTL)** ⚠	**1**
		(ICs)	
IC101	PQVITC4066BF	IC S	1
IC102	PQVINJM2113M	IC	1
IC103	AN6382NFA	IC	1
IC104	PFVINJM4558M	IC	1
IC105	PQVIMT3274AE	IC S	1
		(TRANSISTORS)	
Q105	2SC2235	TRANSISTOR(SI)	1
Q106	2SD2136	TRANSISTOR(SI)	1
Q107	2SD1819A	TRANSISTOR(SI) S	1
		[OR 2SC4155 OR 2SC4081]	
Q108	2SD1921Q	TRANSISTOR(SI) [OR 2SD1994A]	1
Q109	2SA1627	TRANSISTOR(SI)	1
Q110	PQVTDTC143E	TRANSISTOR(SI) [OR UN521]	1
		(DIODES)	
D104	MA4056	DIODE(SI)	1
D107	PQVDHZS2B1	DIODE(SI)	1
D108	MA4056	DIODE(SI)	1
D109	1SS119	DIODE(SI)	1
D110	1SS119	DIODE(SI)	1
D111	1SS119	DIODE(SI)	1
D112	1SS119	DIODE(SI)	1
D114	1SS119	DIODE(SI)	1
D115	PQVDS1ZB40F1	DIODE(SI)	1
D116	1SS119	DIODE(SI)	1
D118	1SS119	DIODE(SI)	1
		(CONNECTORS & JACKS)	
CN101	PQJS12A10Z	CONNECTOR, 12 PIN	1
CN102	PQJS12A10Z	CONNECTOR, 12 PIN	1
CN103	PQJS07A10Z	CONNECTOR, 7 PIN	1
CN104	PQJP2G30Z	CONNECTOR, 2 PIN	1
CN105	PQJP02G100Z	CONNECTOR, 2 PIN	1
CN106	PFJP02A06Z	CONNECTOR, 2 PIN	1
CN107	PQJJ1TB18Z	JACK	1
CN108	PFJJ1T01Z	JACK	1
		(SWITCH)	
SW101	PFSH1A02Z	SWITCH	1
		(CERAMIC FILTER)	
X101	PQVBT4.19G2	CERAMIC FILTER	1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(COILS)	
L101~104	PQLQR1RM601	COIL	4
L105	PQLQR1E32A07	COIL	1
L106	PQLQR1E32A07	COIL	1
L108~111	PQLQR2KA113T	COIL	4
FLT101	PFLE003	COIL	1
		(PHOTO COUPLERS)	
PC101	0N3131SKU	PHOTO ELECTRIC TRANSDUCER	⚠ 1
PC102	0N3131SKU	PHOTO ELECTRIC TRANSDUCER	⚠ 1
PC103	PQVITLP627	PHOTO ELECTRIC TRANSDUCER	⚠ 1
PC104	PQVIPC814K	PHOTO ELECTRIC TRANSDUCER	⚠ 1
		(TRANSFORMERS)	
T101	PQLT8E7A	TRANSFORMER	⚠ 1
T102	PQLT8E6A	TRANSFORMER	⚠ 1
		(VARISTORS)	
SA101	PQVDDSS301L	VARISTOR	1
SA102	PFVDRA102M	VARISTOR	1
ZNR101	ERZVA7D121	VARISTOR	1
		(COMPONENTS PARTS)	
L107	EXCELDR35	COMPONENTS PARTS	1
		(THERMISTOR)	
POS101	PFRT002	THERMISTOR	1
		(RESISTORS)	
D117	ERDS2TJ560	56	1
L112	ERJ3GEY0R00	0	1
L113	ERJ3GEY0R00	0	1
J1	ERJ3GEY0R00	0	1
J2	ERJ3GEY0R00	0	1
JJ115	ERJ3GEY0R00	0	1
R101	ERJ3GEYJ103	10K	1
R102	ERJ3GEYJ103	10K	1
R103	ERJ3GEYJ224	220K	1
R104	ERJ3GEYJ224	220K	1
R105	ERJ3GEYJ224	220K	1
R106	ERJ3GEYJ224	220K	1
R107	ERJ3GEYJ122	1.2K	1
R108	ERJ3GEYJ472	4.7K	1
R110	ERJ3GEYJ562	5.6K	1
R113	ERJ3GEYJ102	1K	1
R114	ERJ3GEYJ472	4.7K	1
R116	ERJ3GEYJ153	15K	1
R123	ERJ3GEYJ103	10K	1
R125	ERJ3GEYJ103	10K	1
R129	ERJ3GEY0R00	0	1

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Ref. No.	Part No.	Value	Pcs
R134	ERDS2TJ4R7	4.7	1
R136	ERJ3GEYJ104	100K	1
R139	ERJ3GEYJ114	110K	1
R140	ERJ3GEYJ562	5.6K	1
R141	ERJ3GEYJ114	110K	1
R142	ERJ3GEYJ103	10K	1
R144	ERJ3GEYJ563	56K	1
R145	ERJ3GEYJ563	56K	1
R146	ERJ3GEYJ333	33K	1
R147	ERJ3GEYJ333	33K	1
R149	ERJ3GEYJ103	10K	1
R150	ERJ3GEYJ223	22K	1
R151	ERJ3GEYJ333	33K	1
R152	ERJ3GEYJ683	68K	1
R156	ERJ3GEYJ124	120K	1
R157	ERJ3GEYJ223	22K	1
R158	ERJ3GEYJ154	150K	1
R159	ERJ3GEYJ103	10K	1
R160	ERJ3GEYJ183	18K	1
R161	ERJ3GEYJ124	120K	1
R162	ERJ3GEYJ123	12K	1
R163	ERJ3GEYJ102	1K	1
R164	ERJ3GEYJ273	27K	1
R165	ERJ3GEYJ562	5.6K	1
R166	ERJ3GEYJ104	100K	1
R167	ERJ3GEYJ101	100	1
R168	ERJ3GEYJ101	100	1
R169	ERJ3GEYJ101	100	1
R170	ERJ3GEYJ472	4.7K	1
R171	ERJ3GEYJ223	22K	1
R172	ERJ3GEYJ332	3.3K	1
R173	ERJ3GEYJ272	2.7K	1
R174	ERJ3GEYJ152	1.5K	1
R175	ERJ3GEYJ104	100K	1
R176	ERJ3GEYJ562	5.6K	1
R177	ERJ3GEYJ334	330K	1
R178	ERJ3GEYJ121	120	1
R179	ERJ3GEY0R00	0	1
R180	ERJ3GEYJ562	5.6K	1
R182	ERJ3GEYJ123	12K	1
R183	PQ4R10XJ391	390 S	1
R185	ERDS2TJ5R6	5.6	1
R186	ERJ3GEYJ334	330K	1
R187	ERJ3GEYJ473	47K	1
R188	ERJ3GEYJ153	15K	1
R189	ERJ3GEYJ273	27K	1
R190	PQ4R10XJ000	0	1
R191	ERJ3GEYJ561	560	1
R192	PQ4R10XJ822	8.2K S	1
R193	ERJ3GEYJ105	1M	1
R194	ERJ3GEYJ683	68K	1
R195	ERJ3GEYJ682	6.8K	1
R196	ERJ3GEYJ224	220K	1
R197	ERJ3GEYJ333	33K	1
R198	ERJ3GEYJ334	330K	1
R199	ERJ3GEYJ104	100K	1
R200	ERJ3GEYJ393	39K	1
R201	ERJ3GEYJ103	10K	1
R202	ERJ3GEYJ104	100K	1
R203	ERJ3GEYJ104	100K	1
R204	ERJ3GEYJ822	8.2K	1
R205	ERJ3GEYJ222	2.2K	1
R206	ERJ3GEYJ222	2.2K	1
R207	PQ4R10XJ103	10K S	1
R208	ERJ3GEYJ103	10K	1
R209	ERJ3GEYJ103	10K	1
R210	ERJ3GEYJ103	10K	1
R211	ERJ3GEYJ103	10K	1
R212	ERDS2TJ472	4.7K	1
R213	ERJ3GEYJ103	10K	1
R214	ERJ3GEYJ104	100K	1
R215	ERJ3GEYJ182	1.8K	1
R216	ERJ3GEYJ222	2.2K	1
R217	ERJ3GEYJ153	15K	1
R218	ERJ3GEYJ153	15K	1
R219	ERJ3GEYJ100	10	1
R220	ERJ3GEYJ103	10K	1
R221	ERJ3GEYJ152	1.5K	1
R222	ERJ3GEYJ472	4.7K	1
R223	ERG2SJ681	680	1
R224	ERJ3GEYJ471	470	1
R225	ERJ3GEYJ152	1.5K	1
R226	ERJ3GEYJ223	22K	1
R227	ERJ3GEYJ101	100	1
R228	ERJ3GEYJ102	1K	1
R229	ERDS1TJ473	47K S	1
R230	ERJ3GEYJ101	100	1
R231	ERDS1TJ473	47K S	1
R234	ERJ3GEYJ333	33K	1
R236	ERJ3GEYJ103	10K	1
R238	ERJ3GEYJ103	10K	1
R241	ERG1SJ122	1.2K	1
		(CAPACITORS)	
C101	ECA0JM101	100	1
C102	PQCUV1C224KB	0.22	1
C103	ECUV1C104KBV	0.1	1
C104	ECEA1HU4R7	4.7	1
C105	PQCUV1C224KB	0.22	1
C106	ECUV1C104KBV	0.1	1
C111	PQCUV1H105JC	1 S	1
C112	PQCUV1H105JC	1 S	1
C114	ECUV1H102KBV	0.001	1
C118	ECUV1H103KBV	0.01	1
C120	ECA0JM101	100	1
C123	ECUV1H103KBV	0.01	1
C126	ECEA1HKS100	10 S	1
C127	PQCUV1H104ZF	0.1	1
C128	ECUV1H181JCV	180P	1
C129	ECUV1H123KBV	0.012	1
C130	ECUV1H181JCV	180P	1
C131	ECUV1C104KBV	0.1	1

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Ref. No.	Part No.	Value	Pcs
C132	ECUV1C104KBV	0.1	1
C134	ECUV1C683KBV	0.068	1
C135	ECUV1H223KBV	0.022 S	1
C136	ECUV1H333KDV	0.033 S	1
C137	ECUV1H223KBV	0.022 S	1
C138	ECUV1C104KBV	0.1	1
C140	ECUV1C104KBV	0.1	1
C142	ECUV1H223KBV	0.022 S	1
C145	ECUV1H682KBV	0.0068	1
C146	ECUV1H272KBV	0.0027	1
C147	ECUV1H101JCV	100P	1
C148	ECUV1H222KBV	0.0022	1
C149	ECEA1CK101	100 S	1
C150	ECUV1H821KBV	820P	1
C151	ECUV1H561JCV	560P S	1
C152	ECEA1HKS4R7	4.7 S	1
C153	ECUV1C683KBV	0.068	1
C154	ECUV1C104KBV	0.1 S	1
C155	PQCUV1H105JC	1 S	1
C156	ECUV1H102KBV	0.001	1
C157	ECEA1CK101	100 S	1
C158	ECUV1H103KBV	0.01	1
C159	ECUV1C104KBV	0.1 S	1
C160	ECEA1HU100	10	1
C161	ECA0JM101	100	1
C162	ECUV1C104KBV	0.1 S	1
C163	ECUV1H681KBV	680P	1
C164	ECUV1H681KBV	680P	1
C165	ECEA1HKS4R7	4.7 S	1
C166	ECUV1H392KBV	0.0039	1
C167	ECUV1H681KBV	680P	1
C168	ECEA1EKS330	33 S	1
C169	ECUV1H101JCV	100P	1
C172	ECUV1C104KBV	0.1 S	1
C173	ECUV1C104KBV	0.1	1
C175	ECEA1HKS100	10 S	1
C176	ECUV1H333KDV	0.033 S	1
C178	ECUV1C104KBV	0.1	1
C179	ECUV1C104KBV	0.1 S	1
C180	ECUV1H153KBV	0.015	1
C181	ECUV1H331JCV	330P S	1
C183	ECUV1C104KBV	0.1 S	1
C184	ECUV1C104KBV	0.1	1
C185	ECEA1HKS100	10 S	1
C186	ECA0JM101	100	1
C187	ECA0JM101	100	1
C188	ECUV1C104KBV	0.1 S	1
C189	ECUV1H183KBV	0.018	1
C190	ECEA1HKS100	10 S	1
C191	ECUV1H821KBV	820P	1
C192	ECEA1CU221	220	1
C193	ECUV1H271KBV	270P	1
C194	ECUV1C104KBV	0.1 S	1
C195	ECUV1C104KBV	0.1	1
C196	ECEA1HU100	10	1
C197	ECUV1H821KBV	820P	1
C198	ECUV1H680JCV	68P	1
C199	ECA0JM101	100	1
C200	ECEA1VU330	33	1

Ref. No.	Part No.	Value	Pcs
C202	ECUV1H472KBV	0.0047	1
C203	ECUV1H103KBV	0.01	1
C204	ECUV1C104KBV	0.1	1
C205	PQCUV1H105JC	1 S	1
C206	ECEA1HKS100	10 S	1
C207	ECUV1C473KBV	0.047	1
C208	ECUV1H182KBV	0.0018	1
C209	PQCUV1H104ZF	0.1	1
C210	ECA0JM101	100	1
C211	ECUV1H333KDV	0.033 S	1
C212	ECUV1H333KDV	0.033 S	1
C213	PQCUV1H104ZF	0.1	1
C214	ECEA1HKS2R2	2.2 S	1
C215	ECKD2H681KB	680P S	1
C216	ECKD2H681KB	680P S	1
C217	ECEA1HKS010	1 S	1
C218	ECEA1CKS470	47 S	1
C219	ECUV1C104KBV	0.1 S	1
C220	ECUV1H103KBV	0.01	1
C221	ECUV1H103KBV	0.01	1
C222	ECUV1H103KBV	0.01	1
C223	ECEA0JKS220	22 S	1
C224	ECUV1H103KBV	0.01 S	1
C225	ECUV1H332KBV	0.0033	1
C226	ECQE2E334KZ	0.33 S	1
C227	ECUV1H103KBV	0.01 S	1

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Ref. No.	Part No.	Part Name & Description & Value	Pcs
		OPERATION BOARD PARTS	
PCB3	**PFLP1136MZ**	**OPERATION BOARD ASS'Y (RTL)**	**1**
		(IC)	
IC301	MN53007QAF	IC	1
		(DIODES)	
D363	1SS119	DIODE(SI) S	1
D364	1SS119	DIODE(SI) S	1
LED301~ LED303	PQVDR325CA47	LED S	3
		(CONNECTORS)	
CN301	PQJP11G43Y	CONNECTOR, 11 PIN	1
CN302	PQJS10X59Z	CONNECTOR, 10 PIN	1
		(SWITCHES)	
SW301~ SW337	EVQ11Y05B	SWITCH S	37
SW350	EVQVEHF1712B	SWITCH	1
		(PHOTO COUPLERS)	
PI301~ PI303	CNA1006N	PHOTO ELECTRIC TRANSDUCER S	3
		(RESISTORS)	
R307	ERJ3GEYJ181	180	1
R308	ERJ3GEYJ181	180	1
R309	ERJ3GEYJ181	180	1
R310	ERJ3GEYJ101	100	1
R311	ERJ3GEYJ181	180	1
R312	ERJ3GEYJ181	180	1
R322	ERJ3GEYJ102	1K	1
R323	ERJ3GEYJ273	27K	1
R332	ERJ3GEYJ471	470	1
R333	ERJ3GEYJ471	470	1
R334	ERJ3GEYJ471	470	1
R341	ERJ3GEYJ181	180	1
R342	ERJ3GEYJ181	180	1
R343	ERJ3GEYJ181	180	1
R344	ERJ3GEYJ181	180	1
R345	ERJ3GEYJ181	180	1
R346	ERJ3GEYJ181	180	1
R347	ERJ3GEYJ181	180	1
R348	ERJ3GEYJ181	180	1
R361	ERJ3GEYJ181	180	1
R362	ERJ3GEYJ181	180	1
R363	ERJ3GEYJ103	10K	1
R364	ERJ3GEYJ103	10K	1
R365	ERJ3GEYJ103	10K	1
R366	ERJ3GEYJ181	180	1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
R381	ERJ3GEYJ563	56K	1
R382	ERJ3GEYJ331	330	1
R383	ERJ3GEYJ331	330	1
R384	ERJ3GEYJ331	330	1
R385	ERJ3GEYJ101	100	1
R392	ERJ3GEY0R00	0	1
R396	ERJ3GEYJ102	1K	1
R397	ERJ3GEYJ102	1K	1
		(CAPACITORS)	
C301	ECUV1C104KBV	0.1 S	1
C302	ECEA1AKS101	100	1
C305	ECUV1H122KBV	0.0012	1
C307	ECUV1H331JCV	330P	1
C309	ECUV1H331JCV	330P	1
C310	ECUV1H331JCV	330P	1
C322	ECUV1C104KBV	0.1 S	1
C331	ECUV1C104KBV	0.1 S	1
C332	ECUV1C104KBV	0.1 S	1
C351	ECUV1C104KBV	0.1 S	1
C352	ECUV1C104KBV	0.1 S	1
C363	ECUV1C104KBV	0.1 S	1
C364	ECUV1C104KBV	0.1 S	1
C365	ECUV1C104KBV	0.1 S	1
C366	PQCUV1H331JC	330P	1
		POWER SUPPLY BOARD PARTS	
PCB4	**PFLP1131MZL**	**POWER SUPPLY BOARD ASS'Y ⚠(RTL)**	**1**
		(ICs)	
IC101	PFVIFA5317P	IC	1
IC201	AN1431T	IC	1
		(TRANSISTOR)	
Q101	PQVTFS10KM10	TRANSISTOR(SI)	1
		(DIODES)	
D101	PFVD1N4005	DIODE(SI)	1
D102	PFVD1N4005	DIODE(SI)	1
D103	PFVD1N4005	DIODE(SI)	1
D104	PFVD1N4005	DIODE(SI)	1
D105	PFVDAG01A	DIODE(SI)	1
D106	1SS119	DIODE(SI)	1
D107	MA4220	DIODE(SI)	1
D108	PQVDERA1802	DIODE(SI)	1
D201	PFVDSF5LC20U	DIODE(SI)	1
D202	PFVDD1NL20U	DIODE(SI)	1

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Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(CONNECTORS)	
CN31	PQJP2D98Z	CONNECTOR, 2 PIN	1
CN301	PQJP6G100Z	CONNECTOR, 6 PIN	1
		(FUSES)	
F101	PQBA1C50NBKL	FUSE	1
F201	PFBA19372	FUSE	1
		(COILS)	
L101	ELF15N010A	COIL ⚠	1
L201	PQLE53	COIL	1
		(PHOTO COUPLERS)	
PC101	0N3131S	PHOTO ELECTRIC TRANSDUCER	⚠ 1
		(COMPONENTS PARTS)	
L103	EXCELDR35	COMPONENTS PARTS	1
		(TRANSFORMER)	
T101	ETS29AZ1X5AC	TRANSFORMER ⚠	1
		(VARIABLE RESISTOR)	
VR201	EVNDJAA03B53	VARIABLE RESISTOR	1
		(VARISTOR)	
ZNR101	ERZV10DK471U	VARISTOR ⚠	1
		(RESISTORS)	
R101	ERDS2TJ105	1M ⚠	1
R102	ERDS2TJ393	39K	1
R103	ERDS2TJ393	39K	1
R104	ERG1SJ473P	47K	1
R105	ERX2SJR22	0.22	1
R106	ERG2SJ101	100	1
R107	PQ4R10XJ680	68	1
R108	ERDS2FJ150	15	1
R109	ERDS2FJ220	22	1
R121	ERDS2TJ103	10K	1
R122	PQ4R10XJ561	560	1
R123	PQ4R10XJ561	560	1
R124	PQ4R10XJ181	180	1
R125	PQ4R10XJ103	10K	1
R126	PQ4R10XJ562	5.6K	1
R127	PQ4R10XJ102	1K	1
R128	PQ4R10XJ100	10	1
R129	PQ4R10XJ104	100K	1
R130	PQ4R10XJ104	100K	1
R131	PQ4R10XJ823	82K	1
R203	ERDS2TJ332	3.3K	1
R205	ERG1SJ222	2.2K	1
R221	PQ4R10XJ222	2.2K	1
R222	PQ4R10XJ222	2.2K	1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
R223	PQ4R10XJ101	100	1
R224	PQ4R10XJ273	27K	1
R225	PQ4R10XJ332	3.3K	1
		(CAPACITORS)	
C101	ECQU2A224MG	0.22 ⚠	1
C102	ECQU2A473MG	0.047 ⚠	1
C103	PFKDE2GA222M	0.0022 ⚠	1
C104	PFKDE2GA222M	0.0022 ⚠	1
C105	PFKDE2GA472M	0.0022 ⚠	1
C106	EEUEB2D181U	180	1
C108	ECKD3A102KBP	0.001	1
C109	ECA1VHG470	47	1
C119	ECKD3A221KBP	220P	1
C121	ECUV1H472KBN	0.0047	1
C122	ECUV1C224KBX	0.22	1
C123	ECUV1H471JCX	470P	1
C124	ECUV1H104KBW	0.1	1
C201	EEUFA1V471	470	1
C202	ECKD3A102KBP	0.001	1
C203	PFCEA16B470	47P	1
C205	ECQV1H474JL	0.47	1
C222	ECUV1H104KBX	0.1	1
C223	ECUV1H104KBW	0.1	1
CCD BOARD PARTS			
PCB5	**PFWP2FP200M**	**CCD BOARD ASS'Y (RTL)**	**1**
		(ICs)	
IC801	PFWP2FP200M	CCD BOARD ASS'Y (RTL)	1
		(TRANSISTORS)	
Q801 ,802	2SB1218A	TRANSISTOR(SI) [OR 2SA1576R] S	2
Q803	2SD1819A	TRANSISTOR(SI) [OR 2SC4155S] S	1
		(CONNECTOR)	
CN801	PQJP8G30Y	CONNECTOR, 8P	1
		(CAPACITORS)	
C801	PQCUV1E104MD	0.1 S	1
C803	ECEA1CKS101	100	1
C804	PQCUV1E104MD	0.1 S	1

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Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(RESISTORS)	
J801	PQ4R18XJ000	0 S	1
J802,803	PQ4R10XJ000	0 S	2
R801,802	PQ4R10XJ202	2K S	2
R803	PQ4R10XJ100	10 S	1
R804	PQ4R10XJ242	2.4K S	1
R805	PQ4R10XJ272	2.7K S	1
R806	PQ4R10XJ242	2.4K S	1
R807	PQ4R10XJ272	2.7K S	1
R808,809	PQ4R10XJ471	470 S	2
R810	PQ4R10XJ681	680 S	1
R811,812	PQ4R10XJ101	100 S	2
R830	PQ4R10XJ000	0 S	1
		(VARIABLE RESISTOR)	
VR801	EVNDXAA03B23	SEMI-FIXED RESISTOR, 2K	1
HOOK SWITCH AND SENSOR BOARD PARTS			
PCB6	**PFLP1130MZ**	**HOOK SW/SENSOR BOARD ASS'Y (RTL)**	**1**
		(ICs)	
IC401	PQVIBA12003	IC S	1
IC402	PQVIBA12003	IC S	1
		(TRANSISTORS)	
Q401	2SB1322	TRANSISTOR(SI) [OR 2SB1237] S	1
Q402	2SB1322	TRANSISTOR(SI) [OR 2SB1237] S	1
		(DIODES)	
D401	1SS147	DIODE(SI)	1
D402	MA7200	DIODE(SI) S	1
D403	1SS147	DIODE(SI)	1
D404	MA7200	DIODE(SI) S	1
D405	1SS147	DIODE(SI)	1
D406	1SS147	DIODE(SI)	1
		(CONNECTORS)	
CN401	PQJP5G30Y	CONNECTOR, 5 PIN	1
CN402	PQJP9G30Y	CONNECTOR, 9 PIN	1
CN403	PQJP06G100	CONNECTOR, 6 PIN	1
CN404	PQJP02G100Z	CONNECTOR, 2 PIN	1
CN405	PQJP5G30Y	CONNECTOR, 5 PIN	1
CN406	PQJP03G100Z	CONNECTOR, 3 PIN	1
CN407	PQJP3G30Y	CONNECTOR, 3 PIN	1
CN408	PQJP3G38Z	CONNECTOR, 3 PIN	1
		(SWITCH)	
SW401	ESE14A211	SWITCH	1
		(PHOTO COUPLERS)	
PI402	CNA1006N	PHOTO ELECTRIC TRANSDUCER S	1
PI403	PQVIPS4506	PHOTO ELECTRIC TRANSDUCER S	1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(FUSE)	
F401	PQBA1N025NMA	FUSE	1
		(RESISTORS)	
R401	ERDS2TJ821	820	1
R402	ERDS2TJ332	3.3K	1
R403	ERDS2TJ821	820	1
R404	ERDS2TJ332	3.3K	1
		(CAPACITORS)	
C401	ECEA1VKA220	22	1
FIXTURES AND TOOS			
EC 1	PQZZ2K6Z	EXTENSION CORD, 2 PIN	1
EC 2	PQZZ2K12Z	EXTENSION CORD, 2 PIN	2
EC 3	PQZZ2K13Z	EXTENSION CORD, 2 PIN	1
EC 4	PQZZ3K5Z	EXTENSION CORD, 3 PIN	1
EC 5	PQZZ2K6Z	EXTENSION CORD, 2 PIN	1
EC 6	PQZZ3K12Z	EXTENSION CORD, 3 PIN	1
EC 7	PFZZ5K13Z	EXTENSION CORD, 5 PIN	2
EC 8	PQZZ12K4Z	EXTENSION CORD, 12 PIN	1
EC 9	PQZZ6K14Z	EXTENSION CORD, 6 PIN	1
EC10	PQZZ8K18Z	EXTENSION CORD, 8 PIN	1
EC12	PQZZ9K4Z	EXTENSION CORD, 9 PIN	1
EC13	PQZZ6K14Z	EXTENSION CORD, 6 PIN	1
EC14	PQZZ12K4Z	EXTENSION CORD, 12 PIN	1
EC15	PFZZ12K2Z	EXTENSION CORD, 12 PIN	1
EC16	PFZZ7K15Z	EXTENSION CORD, 7 PIN	1
	PFZZ2FP200M	SEPARATION SPRING HEIGHT TOOL (See P.114)	1
	PFZZ1F780M	CCD TOOL (See P.114)	1
	PFZZFP200M	SENSOR BOARD TOOL (See P.125)	1
	PFZZFP270M	SPECIAL ROM TOOL (See P.75)	1

Notes:

1. Sensor Board Tools and Extension Cords (Ref. No. EC2, EC10) are necessites for servicing.
2. Extension Cords (Ref. No. EC1, EC3-EC9, EC11-16) are useful servicing. (They make servicing easy.)

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